Escola de Camins
Escola Tècnica Superior d'Enginyeria de Camins, Canals i Ports
UPC BARCELONATECH

TREBALL FINAL DE GRAU

Economic study of Lleida - Alguaire Airport

Treball realitzat per:
Luis Miguel Morell Batlle

Dirigit per:
Alvaro Garola Crespo

Grau en:
Enginyeria Civil

Barcelona, Juny 2017

Departament d'Enginyeria Civil i Ambiental

Gratefulness:

I would really like to thank all the people who have been supporting me all the time and who have encouraged me to beat myself.

Obviously, I want to thank the professor Àlvar Garola, who have guided my thesis, and thank all my family (LM, AB, PC, MB and JS) for all their encouragement.

Thank you all very much.

ABSTRACT

Currently, the world has become completely globalized and, in relation to this fact, both passengers and freight transport has become very important in our society. In fact, one of the main essential elements in connection with transport is the infrastructures which are necessary so as to make transport possible and efficient.

This thesis is based on analysing the infrastructure that is necessary so as to develop one of the most important modes of transport: the air transport and, in relation to this, the airports. In fact, this thesis analyses the airport of Lleida - Alguaire, which is a relatively new airport that was built in 2010 near the city of Lleida, which has 138.144 inhabitants. The construction of such an important infrastructure near Lleida was an extraordinary scenario because of the relatively small amount of citizens living within the area. Owing to this fact, this thesis has analysed the Lleida - Alguaire Airport so as to know whether it was a good idea to have an airport built near Lleida.

The analysis of the Lleida - Alguaire Airport has been realized from two different points of view:

- On the one hand, the airport has been analysed both economically and financially through its *Profit and Loss Accounts*.
- On the other hand, the airport has been analysed from a social point of view trhough a *Cost Benefit Analysis.* In fact, it has been socially compared with the other important airports located nearby: Reus Airport, Girona Airport, Barcelona Airport and Toulouse Airport.

Moreover, so as to analyse appropriately the Lleida - Alguaire Airport, three sensitivity analyses have been realized by assuming different scenarios.

To sum up, according to the results obtained in this thesis, the Lleida - Alguaire Airport is neither economically nor socially profitable owing to the amount of passengers who are interested on using the infrastructure and because of its capacity. Nevertheless, the Lleida - Alguaire Airport might attract some business activities in the long term which could benefit the local economy and income.

Key words: Transport, Air Transport, Airport, Lleida - Alguaire Airport, Reus Airport, Girona Airport, Barcelona Airport, Toulouse Airport, Demand, Capacity, Profit and Loss Account, Cost Benefit Analysis, Sensitivity Analysis, Internal Rate of Return (IRR), Net Present Value (NPV).

RESUMEN

Actualmente, el mundo está totalmente globalizado y, en relación con esto, el transporte de pasajeros y carga tiene mucha importancia en nuestra sociedad. De hecho, uno de los elementos esenciales en relación al transporte son las infraestructuras, que son necesarias para hacer posible y eficiente el transporte.

Esta tesis se basa en el análisis de la infraestructura que es necesaria para desarrollar uno de los modos de transporte más importantes: el transporte aéreo y, en relación a éste, los aeropuertos. De hecho, esta tesis analiza el Aeropuerto de Lleida - Alguaire, que es un aeropuerto relativamente nuevo que fue construido en el año 2010 cerca de la ciudad de Lleida, que tiene 138.144 habitantes. La construcción de una infraestructura tan importante cerca de la ciudad de Lleida fue una situación extraordinaria debido a la pequeña cantidad de habitantes que habitan en la zona. Por este motivo, esta tesis ha analizado el Aeropuerto de Lleida - Alguaire para saber si fue una buena idea construir un aeropuerto cerca de Lleida.

El análisis del Aeropuerto de Lleida - Alguaire se ha realizado desde dos puntos de vista distintos:

- Por una parte, se ha analizado el aeropuerto económica y financieramente a partir de la *Cuenta de Pérdidas y Ganancias*.
- Por otra parte, el aeropuerto ha sido analizado desde un punto de vista social a partir de un *Análisis Coste Beneficio*. De hecho, ha sido socialmente comparado con los principales aeropuertos próximos: Aeropuerto de Reus, Aeropuerto de Girona, Aeropuerto de Barcelona y Aeropuerto de Toulouse.

Además, para analizar adecuadamente el Aeropuerto de Lleida - Alguaire, se han realizado tres análisis de sensibilidad asumiendo distintos escenarios.

En conclusión, según los resultados obtenidos en esta tesis, el Aeropuerto de Lleida - Alguaire no es rentable ni económica ni socialmente debido al nombre de pasajeros que están interesados en usar la infraestructura y a causa de la capacidad del aeropuerto. Sin embargo, el Aeropuerto de Lleida - Alguaire podría atraer nuevos negocios a largo plazo que podrían beneficiar la economía local y los ingresos.

Palabras clave: Transporte, Transporte Aéreo, Aeropuerto, Aeropuerto de Lleida - Alguaire, Aeropuerto de Reus, Aeropuerto de Girona, Aeropuerto de Barcelona, Aeropuerto de Toulouse, Demanda, Capacidad, Cuenta de Pérdidas y Ganancias, Análisis Coste Beneficio, Análisis de Sensibilidad, Tasa Interna de Retorno (TIR), Valor Actual Neto (VAN).

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1. INTRODUCTION

Transport is a tertiary sector activity that enables the displacement of objects, animals and people from one place (origin) towards another place (destination) by using a vehicle (transport system) that uses a specific infrastructure (transport network). Regarding the two last centuries, transport has been the tertiary sector activity that has undergone the biggest expansion worldwide owing to several factors, such as the constant industrialization, the increase of business and human national and international displacements and, eventually, the technological advances, which have improved the transport system regarding its speed, capacity, safety and lower displacement costs.

In relation to Spain, passengers and cargo transport represents a significantly important economic sector that is constantly growing as a promoting strategy in relation to industry, business and people mobility. The Spanish and European territory models are characterized by having their citizens concentrated within metropolitan areas and, in addition to this, it has to be noted that transport infrastructures have been designed according to a radial structure.
Therefore, transport has become a significant industry in relation to the current globalized economy. Due to this fact and in addition to tourism, business criteria ought to be applied when deciding new transport investments.
Furthermore, transport has to improve both social and economic sustainability. Hence, intermodality ought to be considered so as to ensure compatibility between transport and sustainability.

In connection with air transport and regarding the organization of Aeroports de Catalunya, the airport of Lleida - Alguaire was inaugurated in 2010, thus becoming the first airport built by an autonomic government (Generalitat de Catalunya) within the country as well as the first public airport not managed by AENA. Therefore, a new air transport infrastructure had been built in the area of Lleida - Alguaire (Catalonia, Spain) so as to promote both the tourism and business activities within the region.

Nonetheless, it ought to be considered that the Lleida - Alguaire Airport is not an international infrastructure such as the airport of Barcelona, but a regional platform. Hence, due to its regional properties and because of its relatively short functioning period, it has had several difficulties so as to become profitable. In addition to this, it has to be noted that, within the area, there are other airports that might compete so as to achieve as many users as possible, such as the airports of Girona, Reus, Barcelona and, located in France but not so far away, the airport of Toulouse.

2. THESIS OBJECTIVES

In spite of the fact that the airport of Lleida - Alguaire was inaugurated in 2010, it has not achieved as much profitability as it was designed to have. Owing to this fact, the main aim of this thesis is to analyse the evolution of the mentioned air transport infrastructure and, in addition to this, to propose possible future activities so as to ensure the appropriate profitability of the Lleida - Alguaire Airport.
In fact, the main aim of this thesis is to be able to answer the following question: *Regarding the air transport market scenario that used to exist before 2010, was it really necessary to invest 90 million euros so as to design and build the current airport of Lleida - Alguaire?*

Actually, the Lleida - Alguaire Airport has been analysed through different methods so as to know whether it is profitable or not and to analyse the effect that coherent future activities would have regarding the infrastructure. Therefore:

- On the one hand, the airport has been analysed from a financial point of view, thus using several economic parameters such as the NPV (Net Present Value) and the IRR (Internal Rate of Return).
- On the other hand, the infrastructure has been analysed from a social point of view. Hence, a Cost-Benefit Analysis (CBA) has been realized so as to compare the Lleida - Alguaire Airport with other regional and international airports located within the area. Nevertheless, as it will be explained forwards, the CBA has been realized through several significant assumptions. For instance, and so as to make and appropriate comparison, it has been assumed that all the analysed airports have the same amount of users as the airport of Lleida - Alguaire has, that users come from Gatwick Airport (United Kingdom) and, in addition to this, it has been considered that, once passengers land at their airport of destination, they are really keen on travelling towards the Pyrenees. Hence, it has been assumed that passengers fly from Gatwick Airport, which is an important air transport infrastructure in the UK, towards each of the analysed airports and that, once they have landed, 70% of the total passengers travel towards Andorra, which is a significant destination in the Pyrenees, whereas the other 30% of passengers do not travel.
  Furthermore, the parameters that haven been used through the CBA cover several important issues such as time, distance, capacities, pollution, noise, fuel consume, vehicles functioning, staff cost, possible accidents and the value of land.
- Furthermore, in order to ensure a deep analysis of the Lleida - Alguaire Airport, several sensitivity analyses have also been realized in this thesis. Hence, the main CBA has been modified by considering two different scenarios regarding the place where the English tourists want to go once they land at each analysed airport. The sensitivity analyses scenarios that have been considered are the followings:
  I. 70% of passengers travel to Andorra, whereas the other 30% of passengers travel to the Aigüestortes National Park.
  II. 70% of passengers travel to Boí Taüll Resort, whereas the other 30% of passengers travel to the Aigüestortes National Park.
- Eventually, regarding the scenario of the main CBA according to which 70% of the English tourists travel to Andorra whereas the other 30% do not travel, the amount of necessary users that the Lleida - Alguaire Airport ought to have so as to be socially profitable has been estimated. In fact, so as to be able to answer the aforementioned question *Regarding the air transport market scenario that used to exist before 2010, was it really necessary to invest 90 million euros so as to design and build the current airport of Lleida - Alguaire?* the social Internal Rate of Return (IRR) has been analysed in relation to each specific analysed airport.

3. TRANSPORT

A modern transport system has to be sustainable from an economic, social and environmental point of view. This sentence is stated at the beginning of the "*Llibre blanc. La política europea de transports de cara al 2010: l'hora de la veritat"*. In fact, as it will be explained forwards, this sentence demonstrates some concern regarding the significant high increase in transport demand.

Transport represents one of the most important economic activities of all the countries around the world since the first social human nuclei appeared, due to the fact that it promotes the connection between different countries.
At the beginning, the human being used to be migratory and, due to its limited technical capacities, he had to follow flocks so as to obtain food and clothes. Nevertheless, when the Mesopotamian cities appeared, sedentary (agriculture) and migratory (hunter) human beings started coexisting together. Hence, this new scenario promoted the exchange of products between different cities; owing to this fact, cities became commercially connected through the *Veredas Reales o Imperiales*, which were also used so as to save some money, which would be invested so as to improve the commercial transport routes. For instance, the Roman Empire promoted its own extension and development by building roadways, which are the base of European road transport.
Subsequently, so as to create new commercial markets where it would be possible to sell and buy different products, marine transport was developed, which enable human beings to transport a significantly bigger amount of load and more quickly if compared to the ancient road transport.
Afterwards, in the XVIII century, transport experienced a significant improvement owing to the development of the railway; actually, despite the fact that overtaking and interchange is only available in specific fixed points, the railway enabled the development of several countries due to its improvements if compared with ground transportation.
Eventually, the development of air transport corroborated the importance that transport has in relation to the economic activities between different countries.
Nowadays, transport can be understood as the "science" that analyses how objects, people and data can overpass time and distance efficiently. Therefore, in addition to the design, construction and exploitation of transport infrastructures, the science of transport also analyses several other issues, such as how these infrastructures and transport services are planned, how transport companies are organized, how demand can be forecasted or how transport services can achieve their optimum performance.
Therefore, transport performs a significant role within current societies and it also promotes economic relations between countries. (Knowledge from *Arbesú Iglesias, 2003*).

4. THE AIR TRANSPORT

4.1 Introduction to Air Transport

The air transport has four main distinctive characteristics in relation to other transport systems:

- The air transport system requires state of the art technology.
- The network loses its structural territory effect, due to the fact that air transport is developed in the air and thus it is not limited by any barrier.

- Its logistic costs are very high. The air transport logistic costs are, for instance: stop costs (take off and landing), cabin crew and pilot costs, aircrafts functioning costs, travel time cost (both waiting and travelling time).
- It requires a specific network with a large amount of origins and destinations, which is broadly known as *hub - and - spoke* : in connection with air transport, the main network involves a significant amount of recruitment and distribution points.

Actually, the transport system that has undergone the quickest development is the air transport and, due to this fact, it is important to analyse its history.
(Knowledge from *Arbesú Iglesias, 2003*).

Furthermore, according to AENA, "the air transport allows passengers and cargo transport from one place to another through air means (AENA, 2016a)". In fact, the air transport is characterized by the following five main elements:

- Aircrafts: necessary vehicles so as to enable air transport.
- Air navigation systems: necessary so as to realize appropriate air displacements.
- Airports: necessary origin and destination infrastructure
- Air companies: enterprises that offer air transport between different places.
- Technical and juridical regulation: necessary laws that organize air transport

4.2 Airplane Definition

On the one hand, according to the Real Spanish Academy (2017), "an airplane is an aircraft that weights more than air, provided with wings, whose lifting and progress is due to the performance of one or several engines".
On the other hand, in relation to the International Civil Aviation Organization (2006), "an airplane is an aerodyne propelled by an engine whose lifting during the flight is due to aerodynamic reactions that take place in some surfaces that remain fixed during specific flying conditions".

Moreover, despite the fact that most of the aircrafts have the same main elements, they can be classified in two different types:

- Civil aircrafts: they are used in order to transport passengers or cargo with sanitary aims or as fire protection.
- Military aircrafts: they are used to cover military operations, transport troops and guarantee refuelling.

4.3 Air Transport History

Before the first successful flight took place, several centuries of analyses, dreams and experiments were required. In fact, ancient sages used to think that, in order to fly, it was necessary to copy the movement of birds' wings or to use a medium that was lighter than the air. Between 1890 and 1901, a large amount of experiments were carried out with prototypes provided with an engine. In connection with these experiments, Langley (1901) was the most important due to the fact that it was managed to have an airplane flying, which had no pilot inside and that had been designed at scale (1:4), thus smaller than its real size. It was called *Aerodrome* and it was the first aircraft that was able to fly providing that it weighted more than air and was provided with an engine. Nonetheless, the main characteristic of the air transport evolution was the large amount of accidents that took place at its very beginning.
In fact, all the experiments carried out in the XIX century provided all the necessary knowledge that the Wright brothers needed so as to succeed. Hence, the 17th December of 1903, near

Kitty Hawk (Nord Carolina), the American brothers Wilbur and Orville Wright managed the first piloted flight with an aircraft that weighted more than air and that had an engine. In relation to this important flight, they managed to travel 260 metres in 59 seconds.
Subsequently, the 31st December of 1908, the Wright brothers managed to fly 2 hours and 20 minutes. Moreover, owing to this flight, it was broadly demonstrated that the pilot was able to control all the aircraft while flying, thus being able to ascend, descend and rotate.
Afterwards, during the First World War, a significant development was achieved in relation to aircrafts' design and engines. Consequently, the two wings aircrafts that used to have their engines and helixes at the back were substituted by aircrafts which had their engines at the front. Furthermore, air transport became more efficient when bigger aircrafts' propellers were designed.
Regarding Europe, the first flight took place in France and was realized by the Brazilian Alberto Santos Dumont, who managed to travel 220 metres in 23 seconds. Actually, since 1907, nobody in Europe managed to fly more than 1 minute, which demonstrated that USA had more knowledge about air transport than Europe. Moreover, in relation to Europe, it was in 1919 that the aircraft was used for passengers' transport for the first time, whereas in USA the first aircrafts where used to transport mail.
Therefore, passenger aircrafts increased in several routes such as the one that connected London with Paris owing to the development of much more safe and confortable aircrafts such as the Douglas DC-3, which had two helix engines and was considered to be the main aircraft that promoted the air transport regarding its development in 1936, due to the fact that it was the first aircraft that enabled air companies to gain some money. In fact, the Douglas DC-3 was able to transport 21 passengers at 300 km/h.
Afterwards, in 1950, the British aircraft Vickers Viscount was developed, which was the first aircraft to be propelled by an helix that was moved by a gas turbine.
It has to be noted that the specific necessary aircraft to be used so as to connect two different points is chosen depending on two main factors: the amount of passengers and the distance between airports to be connected, which can vary from 400 km to 11.000 km.
Hence, the air transport developed throughout the years and better aircrafts were designed, which used to be bigger, with more capacity and with better facilities. For instance, the Boeing 707 and the Douglas DC-8 were created in 1958, which were able to travel at 900 km/h and transport more than 100 passengers. Subsequently, several other aircrafts such as the Boeing 727, DC-9, Fokker F-28 or the BAC-111 were developed in order to cover medium distances of 800 - 2.400 km. In addition to this, much bigger aircrafts were also designed: the Boeing 747 Jumbo was developed in 1970 and it was the first commercial aircraft with wide fuselage that was big enough to transport between 400 and 500 passengers. Regarding Europe, the first wide fuselage aircraft was the Airbus 300.
In fact, it is considered that one of the maximum developments of air transport has been the commercial supersonic aircraft, which can travel faster than sound and it is able to cross the North Atlantic and come back in less time than a subsonic aircraft, which travels more slowly than sound, needs to cover one of the aforementioned trips. Actually, the governments of France and United Kingdom promoted the development of the supersonic aircraft Concorde in 1975, whose first trip was from Paris towards Rio de Janeiro. Nevertheless, American air companies have never used supersonic aircrafts.
Nowadays, there is a significant competition between the subsonic aircraft designers Boeing and Airbus. Furthermore, new and bigger aircrafts are currently being designed, such as the A-3XX and the B747X, which are supposed to carry more than 500 passengers and travel more than 16.000 km with no stops.

In connection with Spain, the air transport is also very important regarding both national and international flights:

- On the one hand, national flights are necessary so as to enable the connection between the Spanish Peninsula and the Balearic and Canarias Islands. Moreover, the distance between the Spanish capital and the other coastal cities is big enough so as to promote the air transport.
- On the other hand, international flights are also important owing to the relations between Spain, Latin America and other European countries.

(Knowledge from *Arbesú Iglesias, 2003*).

4.4 Current World Air Transport Scenario

The air transport has become one of the most important industrial activities during the XX century, thus creating new jobs and development. Moreover the air transport has also improved the commercial business and it has increased the opportunities of travelling around the world owing to the fact that it has "reduced" the huge size of the world.
(Knowledge from *Arbesú Iglesias, 2003*).

Actually, according to statistics provided by the International Civil Aviation Organization, 3'441 billion people worldwide used the air transport in 2015. Moreover, in relation to Spain, 206'9 million people used the air transport in 2015 according to statistics carried out by AENA.
In fact, the evolution of passenger air transport in the world and more precisely in Spain can be shown in *Figure 1* and *Figure 2*, respectively.

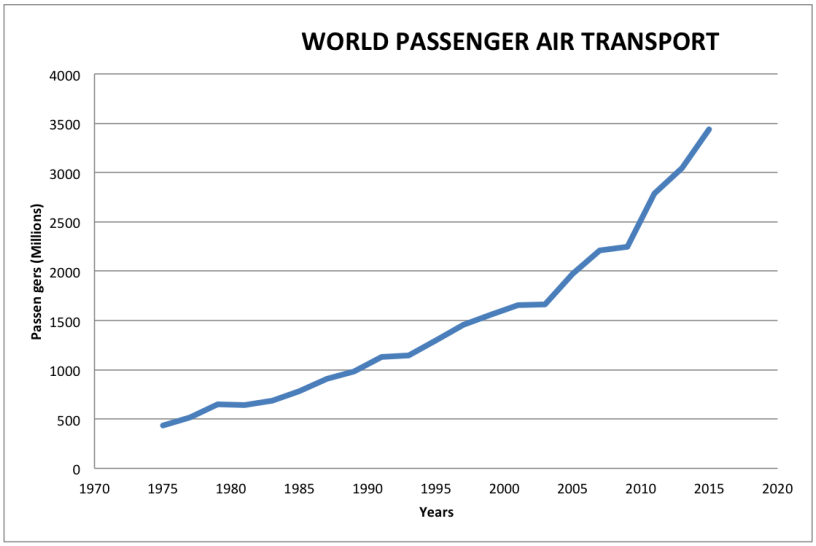

Figure 1: World passenger air transport evolution (graphic realized through data from International Civil Aviation Organization)

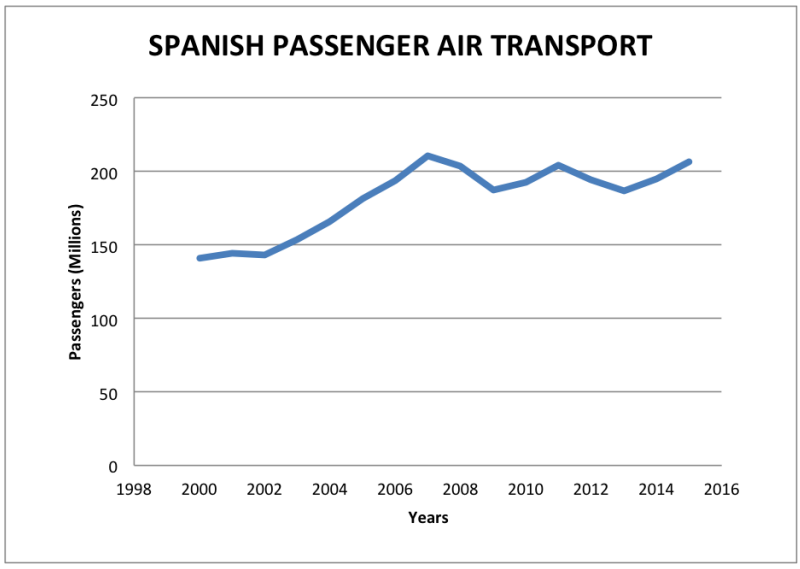

Figure 2: Spanish passenger air transport evolution (graphic realized through data from AENA)

On the one hand, as can be appreciated in *Figure 1*, the world air transport has been continuously increasing, whereas the Spanish air transport has also experienced a significant increase but it is also characterized by some pick and some drops throughout the years. Nonetheless, it can be stated that air transport is a significant important business activity both worldwide and within Spain.

Actually, in relation to the air transport demand, the transport of passengers, aircrafts and cargo has significantly increased in a short period of time, thus more quickly than any other transport system. Consequently, there has also been an increase in the amount of aircrafts and their capacity.
Nevertheless, cargo air transport has not experienced such an enormous increase due to the fact that aircrafts are mainly designed so as to transport passengers, thus cargo transport is known as an additional air company's revenue.
Therefore, demand is an important parameter to be analysed so as to be able to design air transport infrastructures appropriately.

In fact, in relation to cargo air transport, its evolution worldwide and more precisely in Spain can be shown in *Figure 3* and *Figure 4*, respectively:

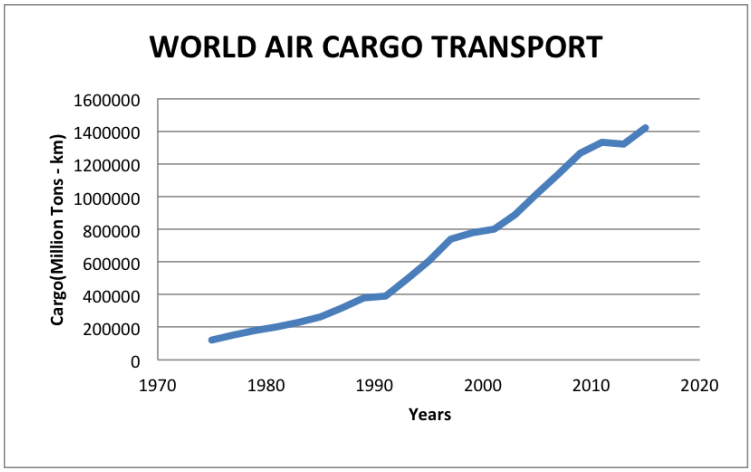

Figure 3: World air cargo transport evolution (graphic realized through data from International Civil Aviation Organization)

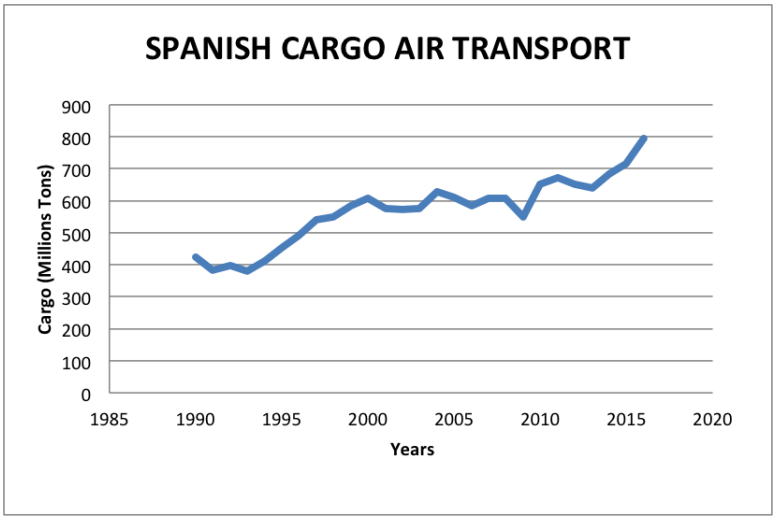

Figure 4: Spanish air cargo transport evolution (graphic realized through data from AENA)

Therefore, similarly to air passenger transport, word cargo air transport (*Figure 3*) has been increasing continuously, whereas in relation to the Spain, the Spanish cargo air transport (*Figure 4*) has experienced some picks and some drops throughout the years.

Therefore, during the XX century and the beginning of XXI century, the development of air transport infrastructures became essential as the main element to promote both the development and upgrade of several countries. Actually, the bigger a country is and the wider its international relations are, the air transport development has been much more important than in other countries that are smaller or do not have as much international contacts.

Furthermore, in relation to the future evolution of air transport, the European Union has the following objectives:

- Maintain the air transport increase under control.
- Overcome the possible saturation of air space.
- Improve safety standards.
- Guarantee environmentally friendly policies.

In fact, in connection with the forth-European objective, it has to be noted that air transport is the main responsible of producing 13% of CO2 transport emissions.

(Knowledge from *Arbesú Iglesias, 2003*).

4.5 Air Transport Infrastructures: The Airport and Surroundings

An airport cannot be analysed as an isolated element even if it is located several kilometres away from any inhabited nuclei. In fact, cities which have their own airport usually grow around the airport owing to the fact that air transport infrastructures are places where there is a large amount of economic activity. Therefore, despite the fact that most of the airports are located in the outskirts of the main city, they finally contribute to the economy of the inhabited nuclei.

Actually, any airport needs a large amount of land where to be installed, alters and defines general urbanism and communication plans and it also influences inhabitants both economically and socially.

In order to build an airport, a large amount of terrain and flatwork is necessary, thus the natural land configuration is significantly altered: some mountains are destroyed whereas it could be necessary to fill low areas and, in addition to this, the local flora and fauna can be also affected because of the land works. Furthermore, so as to build and airport it might be necessary to cut a river and create new channels, thus affecting the natural hydrologic system downstream.

When aircrafts fly through the atmosphere, they produce both noise and polluting gases due to the engines' functioning (smoke, carbon monoxide and dioxide, sulphur dioxide, nitrogen oxides, hydrocarbons, free hydrogen and ozone). Moreover, some airport's facilities also pollute water and produce spills of fuel or solid waste. Therefore, the terrain and also subterranean and superficial watercourses become usually polluted. Owing to this fact, the air transport is controlled by environmentally friendly policies so as to reduce the effects of pollution.

In fact, as aforementioned, one of the main objectives of the European Union in connection with air transport is to be environmentally friendly. For instance, in the last 20 years, noise inside airport has been reduced up to 90% and, in addition to this, the amount of American and European people who used to be affected by aircrafts' noise has been reduced from 20 millions to 1 million people. Moreover, in the last 15 years, carbon monoxide emissions have been reduced up to 70% and the hydrocarbons have been reduced up to 85%.
In fact, organizations are keen on improving these environmentally friendly developments and, taking into account that noise is one of the worst air transport effects, air companies are developing new aircrafts and engines that do not produce as much noise as they used to do. For instance, the aircraft model Boeing 707 was substituted in 1970 by the improved Boeing 727, which was substituted by the Boeing 757, whose engines are more silent and consume less fuel.
In fact, these developments are due to the fact that, in the future, those aircrafts that do not satisfy the environmentally friendly policies of the International Civil Aviation Organization (ICAO) will not be allowed to fly throughout most of the European countries.

(Knowledge from *Arbesú Iglesias, 2003*).

5. THE BUS TRANSPORT

5.1 Bus Introduction

According to the Real Spanish Academy (2017), a bus is a road vehicle designed for transport public and fixed routes that is usually used as urban service. It can carry a large amount of passengers. In fact, according to the article *China's longest bus unveiled in Shanghai (2007)*, buses can have a capacity as high as 300 passengers.
Buses can be used for several reasons, such as scheduled bus transport, scheduled coach transport, school transport, private hire or tourism. Actually, coaches are more confortable and they are used for longer-distance trips.

5.2 Bus History

In connection with the history of buses, according to the article *World History of the Automobile (2013)*, horse-drawn buses were used from the 1820s and they were followed by steam buses, which were develop in the 1830s. Subsequently, electric trolleybuses appeared in

1882. In fact, the first international combustion engine buses, or motorbuses, were developed in 1895. These different types of bus are explained forwards:

- Steam Buses: They were developed in England in the 1830s by Walter Hancock and by the association of Sir Goldsworthy Gurney (*Centenary of the Omnibus, The Times, 1933*). In fact, steam carriages were more safe in relation to overturning, they travelled faster than horse-drawn carriages, they were cheaper to be used and they also caused less damage to the road surface owing to their wide tyres. Nonetheless, hard legislation eliminated mechanically propelled vehicles from the roads of Great Britain for at least 30 years (*The Rise and fall of Non-Government Roads in the United Kingdom*).
- Trolleybuses: According to the article *Trolleybus History - Current Collector* Design, they were developed by the Siemens brothers, William (England) and Ernst Werner (Germany), and they used to function through trolley poles disposed through overhead wires. In fact, contact rollers would run on two suspended wires so as to have the current conducted to the tramcar and back again to the dynamo machine at the main station, without the necessity of running on rails.
- Motorbuses: According to the article *The London B-Type Motor Omnibus (1991)*, the first mass-produced bus model was the B-Type double-decker bus and it was designed by Frank Searle. This type of bus was used by the London General Omnibus Company in 1910 and, in addition to this, it also offered military service on the Western Front during the First World War. Regarding the United States, the major bus manufacturer was founded in Chicago in 1923 by John D. Hertz, which was subsequently bought by General Motors. Eventually, owing to the World War II, several improvements were introduced in relation to bus design: independent front suspension, power steering, automatic gearbox and power-hydraulic braking (*Routemaster Association).*

Nowadays, so as to promote environmentally friendly policies, developments have focused on hybrid electric buses, fuel cell buses and electric buses. In addition to this, buses powered by compressed natural gas or biodiesel are also being developed. In fact, the bus manufacturing industry has been globalised and similar bus designs can be found worldwide.

5.3 Bus Uses

On the one hand, transit buses are usually used on public transport bus services and they are design so as to enable an efficient transport of a large amount of passengers, thus they have several doors. On the other hand, coaches are often used so as to cover longer-distance routes. Nevertheless, both buses and coaches operate according to a determined public transport timetable that defines both the route and the timing.

Actually, buses and coaches are currently used so as to offer several collective services. The main services that buses and coaches can offer are the following:

- Tourism: Worldwide tour buses allow tourists to view local attractions or the main scenery while travelling comfortably through a specific place. Moreover, buses and coaches are also essential regarding the package holiday industry, as they are used to provide private airport transfers as well as organised holiday tours.
- Student transport: Buses and coaches are currently being used so as to transport school children around the world. These vehicles might have specific mandatory features regarding children's transport.
- Promotion: Buses and coaches can also be used for advertising, political campaigns, public information campaigns and promotional purposes. Owing to this fact, it might

be necessary to decorate buses and coaches appropriately for each specific promotion campaign.

6. AIR TRANSPORT ORGANIZATIONS

There are several air transport organizations whose aim is to organize appropriately the air transport worldwide. As explained forwards, on the one hand, IATA and ICAO are worldwide organizations and, on the other hand, AENA and *Aeroports de Catalunya* are local associations.

6.1 IATA

IATA stands for International Air Transport Association, which is a trade association of the world's airlines. It consists of 274 airlines and it represents 117 countries, thus the IATA's member airlines are supposed to carry, approximately, 83% of the total available seat kilometres air traffic. Furthermore, IATA supports air transport activity and it also contributes to formulate new policy and standards. Its headquarter is located in Montreal (Quebec, Canada) and it also has offices in Geneva (Switzerland).
In fact, it was created in April 1945 in Havana (Cuba) to substitute the International Air Traffic Association (1919, Netherlands). For instance, some of its priorities are the following:

- Safety: It is the first priority of IATA, and it is promoted through the IATA Operational Safety Audit (IOSA).
- Security: It has become significantly important due to the 11th September Attacks in 2001. Actually, it is promoted through risk assessments and passenger differentiation.
- Simplifying the Business: This objective was developed in 2004 and, owing to this project, the electronic ticket and the bar coded boarding pass were created, as well as self-service baggage options available for passengers.
- Environment: IATA members have agreed to achieve three main goals: a 1'5% fuel efficiency improvement per annum from 2009 until 2020, reduce in carbon emissions and a 50% reduction in net aviation carbon emissions by 2050 in relation to 2005 levels.

(IATA - International Air Transport Association)

6.2 ICAO

ICAO stands for International Civil Aviation Organization and it is an specialized agency of the United Nations. It was crated the 4th April 1947 and its main aim is to codify both the principles and techniques of international air navigation as well as to ensure an organized growth of international air transport. Its headquarter is located in Montreal (Quebec, Canada).

In relation to the ICAO Council, it provides standards and recommended practices regarding air navigation, its infrastructures, flight inspections, prevention of unlawful interference and border-crossing procedures for international civil aviation. ICAO also defines the protocols to be followed in case of air accidents. Within the ICAO, there is the Air Navigation Commission (ANC), whose main function is to develop aviation standards and recommended practices.

In fact, one of the main projects developed by the ICAO is the "Agreement on CO2 emissions from international aviation, October 2016". In connection with this agreement, which will be officially set in 2021, the 191 members of ICAO will have to reduce up to 80% the global

aviation emissions by 2035 relative to the amount of emissions produced in 2020. *(icao.int International Civil Aviation Organization History, 31 May 2017)*

6.3 AENA and *Aeroports de Catalunya*

As aforementioned, AENA and *Aeroports de Catalunya* are two Spanish air transport organizations, which are explained forwards:

- AENA
  On the one hand, AENA is a Spanish state-owned trading company that manages the main airports within Spain. It was created in 2010 and the public business ENAIRE owns 51% of the company. Actually, it manages 46 airports and 2 heliports within Spain and, in addition to this, AENA International manages 15 airports around Europe and America. In relation to the Spanish airports, they are shown in the following map (*Figure 5*):

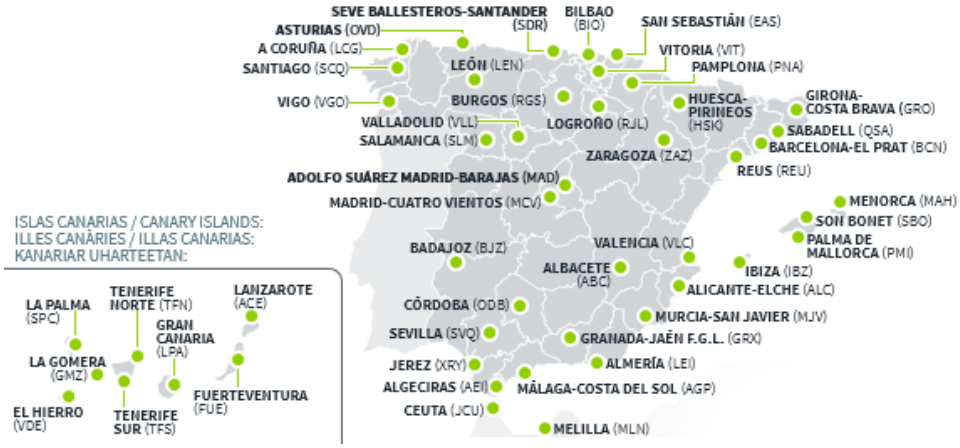

Figure 5: Map of the Spanish airports (AENA)

- *Aeroports de Catalunya*
  On the other hand, *Aeroports de Catalunya* is a public company owned by *Generalitat de Catalunya* and it is related to the Territory and Sustainability Department. It was created in 2008 and its main aim is to manage the airports, aerodromes and heliports owned by *Generalitat de Catalunya*. In fact, *Aeroports de Catalunya* currently has and manages the airport of Lleida - Alguaire and the airport of la Seu d'Urgell.
  This company is keen on developing a new airport management model and, in addition to this, it works promoting and effective commercial policy in order to maintain and improve the Catalan network of airports, aerodromes and heliports. Actually, as shown in the following map (*Figure 6*), it manages the following air transport infrastructures:
  - Airports: Lleida-Alguaire, Barcelona, Girona, Reus.
  - Aerodromes: Cerdanya, Calaf, Igualada-òdena, Empuriabrava, Manresa, Andorra-la Seu, Sabadell.

  (Aeroports de Catalunya)

Figure 6: Map of the Catalan air transport infrastructures (Aeroports de Catalunya)

7. LLEIDA - ALGUAIRE AIRPORT

7.1 Introduction to the Lleida - Alguaire Airport

The Lleida - Alguaire Airport (IATA code: ILD; ICAO code: LEDA) is a regional airport located in the plateau of Alguaire (Lleida, Spain). It can cover any European distance like the Reus or Girona Airports.

Its construction began the summer of 2007 and it was officially inaugurated the 17th January 2010. The first commercial flight took place the 5th February 2010, it was operated by Vueling and it had Paris - Orly as its final destination.

This air transport project had an investment of 90 millions euros and it was managed by the *Generalitat de Catalunya*, thus becoming the first airport built by an autonomic government within the country (Spain) as well as the first public airport not managed by AENA but run by an organization both public and private known as *Aeroports de Catalunya*.

The Lleida - Alguaire Airport has a 2.500 metres long runway and an aircraft parking area capable to host airplanes such as Airbus A320 or A321, which can carry 150 passengers, or regional aircraft suitable for 70 or 80 passengers.

According to some surveys, in addition to citizens from Lleida and the region of Aragon, the airport of Lleida - Alguaire expected international tourists keen on skiing and practising adventure sports as well as businessmen.

Owing to this fact, the Lleida - Alguaire Airport was expected to deal with 400.000 passengers and 3.500 tones of cargo each year, thus becoming a regional airport that would provide both passenger and logistics services within the area. In connection with cargo transport, the airport would offer several services such as parcel, messaging, perishable and third products.

(Aeroports de Catalunya)

7.2 Construction of the Lleida - Alguaire Airport

The construction of an airport in the Alguaire's plateau (near Lleida) was due to Government objectives about territory equilibrium and economic diversification.

Initially, the *Generalitat de Catalunya* wanted to reform and increase the current Alfes Aerodrome so as to operate both cargo and passengers flights in this location. However, this decision was hardly criticised by several ecologic groups led by IPCENA, owing to the fact that the current aerodrome is located in a thyme crop, which has high natural importance. Therefore, the government had to look for another location to build the infrastructure.

Despite the final choice of Alguaire, there were plenty of villages that were looking forward to hosting the infrastructure. The more likely villages to get the airport built were Almacelles,

Alfes (but far from the thyme crop) and Alcarras; these three villages are from the Segria County and they are close to Lleida.
Finally, in 2004, the department of *Política Territorial i Obres Públiques (DPTOP)* decided to locate the Airport in Alguaire, which is 15 km far away from Lleida. The Master Plan of the Lleida - Alguaire Airport was approved in 2006 and, in the end of 2007, it was included to the "Airports, Aerodromes and Heliports Plan of Catalonia", which was approved the 20th January 2009.
In relation to the join between the airport and the road network, it was going to be connected with the current Lleida - Val d'Aran road (N-230) as well as with the future A-14 highway. Moreover, the new infrastructure would also have rail access, thus connecting the airport with the Lleida - Almacelles line, the TGV and the Transversal Rail (*Eix Transversal Ferroviari)*.

The first part of the Lleida - Alguaire Airport construction was awarded the 13th July 2007, thus beginning to create the first airport built by the *Generalitat de Catalunya*. The Management Area of GISA awarded this first part to the Joint Venture (UTE) integrated by *Dragados*, *Obrum* and *Urbanismo y Construcciones*. These works would have a deadline of 14 months and a budget of 29'4 millions euros.
In addition to this, the awarded Joint Venture had to make all the convenient facilities so as to enable the airport appropriate functioning.
To sum up, the Lleida - Alguaire Airport would require a public investment of 56'4 millions euros and a private investment of 60 millions euros.

The Lleida - Alguaire construction was divided in 3 parts, which are the following:

- 1st: The runway and parking area
- 2nd: Terminal and facilities
- 3rd: The control tower and the ultimate terminal

(Observatori de Projectes i Debats Territorials de Catalunya)

<u>1st Part: The runway and parking area</u>

Once this part was awarded, the construction began on August 2007. Throughout this part, they constructed the runway with the necessary join lines as well as the aircraft parking area and car parking area. Other facilities built in this part were the roads that connect the runway with the parking area as well as the road to get to the airport.
In connection with the runway, it is 2.000 metres long and 45 metres wide. These characteristics enable the airport to host aircraft such as Airbus A320 and A321, which can carry up to 150 passengers. In addition to this, the runway would enable the airport to operate cargo aircraft.
The aircraft parking area has 24.300 m^2 (without considering the margins) and it can host the following aircraft combinations:

- 6 places for regional aircraft such as ATR - 72, which has a capacity of 70 - 80 passengers
- 4 places for regional aircraft (ATR - 72) and 2 places for Airbus A320 or A321, which has a capacity of more than 150 passengers.
- 5 places for regional aircraft (ATR - 72) and 1 place for Airbus A320 or A321.

Within the area, there is also the general aviation platform, which can host up to 5 places for private planes.

In addition to this, the street bearing was also constructed, thus connecting the runway with the parking area. The car parking area was urbanized and designed to host up to 240 vehicles. The entire airport was surrounded by a fence which was 8 kilometres long and 2 metres high.
(*Generalitat de Catalunya - GISA)*

2nd Part: Terminal and facilities

The second part of the Lleida - Alguaire Airport construction was awarded for 23'1 millions euros and the main responsible institution was the Catalan Government. This part included the construction of all the aeronautic equipment and facilities necessary to enable the Airport to operate properly.
In relation to the terminal, at the beginning they designed a temporary terminal, which would allow the Airport to start functioning until the private investor constructed the final one. The temporary terminal had 804 m^2 to attend all the passengers and manage the logistics of the luggage. Therefore, it hosted different areas such as technic, services, lobby or restaurant areas.
In connection with the issuers centre, it has 170m^2 and it consists of all the necessary issuer and radio equipment to ensure an accurate operation of the infrastructure.
The fire fighting building was also constructed. It has 453'13m^2 and all the essential facilities in order to ensure safety in case of fire and rescue.
In relation to the power station, it was designed to convert high voltage energy to low voltage energy. Therefore, its function was to provide the Airport with enough electricity to work properly and to signpost the entire airfield with the necessary approximating light system.
Furthermore, they designed a supply station for aviation fuel, a garage to get the aircraft repaired and the entire supply network.
The second part could be constructed at the same time the first part was being carried out and lasted 12 months.
(*Generalitat de Catalunya - GISA)*

3rd Part: The control tower and the ultimate terminal

The enterprises which obtained this concession became the main institution responsible for both constructing and financing the control tower and the ultimate terminal. This third part required a private investment of 60 million euros and it would enable the Airport to start working at its maximum capacity.
Therefore, the 9th April 2008 they started to build the control tower with an investment of 5'6 million euros. The tower and its base would have 3724 m^2.
In connection with the project, the control tower is 25 metres high and it has 300 m^2. Moreover, it can be divided in two main volumes: the tower and its base. On the one hand, the tower develops specific functions of aircraft control and, on the other hand, the tower's base hosts all the facilities necessary to cover all the administrative, technic and logistic necessities of the infrastructure.
The base and the tower are connected by the curve of the main deck that goes from the low floor to the front of the tower. The deck covers the entire infrastructure in order to get an airport environmentally integrated in the area.
In addition to this, the visual union of the entire building is achieved due to the coverage of the front with a metallic sheet, which combines several colours such as green, yellow and brown. Therefore, the main building is integrated within the Lleida's scenery. Moreover, the deck has a vegetal coverage combined with wood and sheet that works as a thermic insulation.
(*Generalitat de Catalunya - GISA)*

To sum up, the Lleida - Alguaire Airport, which was designed in order to enable the landing of aircraft such as Airbus A320 or A321 that can carry up to 150 passengers, has the following main facilities:

- Runway: 2000 metres long and 45 metres wide.
- Flight strip: 200 metres wide.
- Control tower: 25 metres high and it has 300 m^2.
- Aircraft parking area: It is able to host several types of aircrafts in different areas, such as regional, general and sportive aviation. It has 30.600 m^2 of surface. Moreover, it also has an heliport.
- Terminal area: It has 3.200 m^2, in which the following facilities are displayed: hangars, terminal building, local air club and communicating systems. On the one hand, the departure area has 530 m^2, where there are 8 check-in stands for the luggage dropping - off and a waiting room of 450 m^2. On the other hand, the arrival area has 280 m^2, a room of 350 m^2 and 2 main points for luggage recollection.
- Fire fighting facilities and rescue services, as well as the petrol supply station.
- Navigation and approximation systems (IFR).
- Car parking area: It can host up to 240 vehicles.

The access to the Lleida - Alguaire Airport was also awarded. The road that goes from the Alguaire village to Almacelles belongs to the rural roads network and it is 6'1 kilometres long. Afterwards, due to the new access design, the road turned to be 10 metres wide; currently, it has 2 lanes of 3'5 metres width each and 1'5 metres wide edges.
(Generalitat de Catalunya - GISA)

7.3 Location of the Lleida - Alguaire Airport

The Lleida - Alguaire Airport is located within a land that has 367 hectares of surface, 350 metres above sea level, in a village called Alguaire (Segria County). In fact, it was decided to build the Airport in Alguaire owing to the fact that it is nearby Lleida, 15 km away from this city that has 138.144 inhabitants, and because of the fact that Alguaire is located in the middle of the future A-14 and A-22 highways, thus the airport would be properly communicated. On the one hand, the A-22 highway has been recently built and joins Osca with Lleida; on the other hand, the A-14 highway would be a new road to access the Pyrenees and France, communicating Lleida with Sopeira.
In addition to this, the Catalan Government is keen on providing the Airport with a new railway access that would be integrated in the Transversal Railway Axis.
In fact, the final and current location of the Lleida - Alguaire Airport is shown in *Figure 7* and *Figure 8*. Therefore, it is located near the villages of Alguaire, Almacelles, Rosselló, Alpicat and Torrefarrera and, actually, it is limited by a triangle defined by the following three infrastructures: the Almacelles Road at the north, the construction of the new A-14 highway at the east and, eventually, the Saira Channel at the south-west direction that connects with the Channel of Aragon and Catalonia.

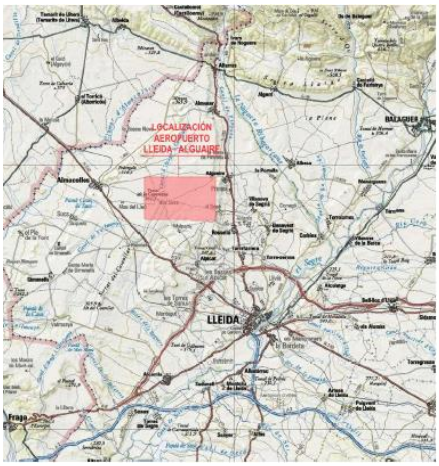

Figure 7

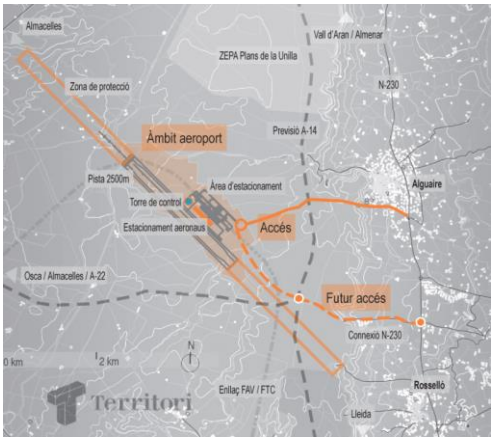

Figure 8

- Figure 7: Location of the Lleida - Alguaire Airport (Generalitat de Catalunya - GISA)
- Figure 8: Location of the Lleida - Alguaire Airport (Observatori de projectes i debats territorials de Catalunya)

In fact, in connection with the airport's surroundings, there are neither industrial activities nor big urban areas, thus the pollution effects caused by the airport can be classified as normal.

(Generalitat de Catalunya - GISA)

7.4 Other parameters of the Lleida - Alguaire Airport

Regarding air transport infrastructures, it is significantly important to analyse its surroundings and the main environmental characteristics of the area. Owing to this fact, the following parameters have been analysed in relation to the Lleida - Alguaire Airport: geology and geotechnical parameters, hydrology, environmental elements and meteorology.

Geology and geotechnical parameters

It is important to analyse and define the main characteristics of the soil where the Lleida - Alguaire Airport has been built, such as the materials, soils and topography.
In fact, regarding Catalonia, there are three main terrain relieves: the Pyrenees, the Mediterranean System and the Central Catalan depression.
The airport of Lleida - Alguaire is located in the Central Catalan depression, which is the oriental prolongation of the Ebre depression and, due to river erosion, there are plenty of ravines. Nevertheless, regarding the occidental area, rivers have not such a big flow, thus the soil remains horizontal.
Therefore, in relation to the geology of the area, it has a smooth morphology integrated by fluvial open valleys and quaternary coatings related to the Noguera - Ribagorçana River. Moreover, the land has tertiary age soils with sandstone and clay.
(Generalitat de Catalunya - GISA)

Hydrology

In connection with hydrology, Catalan rivers are usually short and they have significant slopes. One of their main characteristics is the irregularity of their water flows from one year to another. In addition to this, Catalan rivers can be classified in two different groups:

- The Mediterranean Rivers and torrents that are born through the coastal and littoral mountains and that finish directly at the main sea.
- The Pyrenees Rivers, whose maximum water flow takes place at spring, when the ice of the mountains melts. Nevertheless, during the winter, most of the water flow is retained at the mountains as snow.

Owing to the fact that the Lleida - Alguaire Airport is located in a plateau, there are no water flows that could alter the terrain or produce floods nearby the analysed airport.
(Generalitat de Catalunya - GISA)

Environmental Elements

In connection with environmentally friendly policies, there are several protected areas nearby the Lleida - Alguaire Airport. For instance, some of the protected areas are the following:

- ZEPAs: It sands for Zone of Special Protection for Birds. The ZEPA that is closest to the airport is the one located in *Secans de la Noguera*, which is 10 kilometres far away from the airport.
- LICs: It stands for Place of Community Interest. The LIC that is closest to the airport is the one located in *Aiguabarreig Segre-Noguera Ribagorçana,* which is 7 kilometres far away from the airport.
- PEIN: It stands for Plan of Natural Interesting Spaces. The PEIN that is closest to the airport is the one located in *Aiguabarreig Segre-Noguera Ribagorçana,* which is 7 kilometres far way from the airport.

- Natural Reserve: The closest natural reserves are, on the one hand, the *Reserva Natural Parcial de Mas Melons* and, on the other hand, the *Reserves Naturals de Fauna Salvatge de Utxesa i Sant Llorenç de Montgai,* both of them located 25 kilometres far away from the airport.

(Generalitat de Catalunya - GISA)

Meteorology

Frosts, rain, fog and wind are the main meteorological parameters to be analysed in relation to air transport infrastructures:

- Frosts: From May until September there are no problems caused by frosts, whereas from October until April, frosts appear sporadically. Actually, frosts are more likely to happen between November and March.
- Rain: During the year, rains are distributed according to a bimodal distribution with two relative maximums (50mm/month during autumn and 45 mm/month during spring) and two relative minimums (16mm/month at February and 13 mm/month at July). In fact, September and October is when the daily intensity of rain is highest (6'1 and 5'0), whereas May and December are the months that have more rainy days (10 and 13 days/month).
- Fog: This phenomenon reduces the available visibility within the air transport infrastructure. For instance, according to some surveys carried from 1975 to 2004, the average number of foggy days obtained was 53'6 days affected by fog.
- Wind: In relation to the annual wind rose, the maxim wind speed takes place in the sector (270º - 300º), with speeds that vary between 50km/h and 100 km/h.

(Generalitat de Catalunya - GISA)

7.5 Commercial Evolution of the Lleida - Alguaire Airport

In relation to the commercial evolution of the Lleida - Alguaire Airport, it has been characterized by some picks and some drops. In fact, the wealthy economic situation did not last for a long time in relation to the Lleida - Alguaire Airport. In fact, its financial aids disappeared, oppositely to other airports. Owing to this fact, the infrastructure has suffered lots of changes regarding the offered destinations.
Consequently, in connection with the history of the airport, there are four main stages, which are the following:

- 1) From the inauguration to the beginning of the crisis
  The infrastructure was officially inaugurated the 5th February 2010 (first flight) and the crisis began in the beginning of 2011. Throughout this period, users could choose between the following direct destinations: Paris, Palma, Frankfurt del Main, Milan, Ibiza Island, Menorca, Barcelona, Madrid, Vigo, Tenerife and Canary Islands. Moreover, the following indirect destinations could be chosen through Barcelona: Malaga, Alicante, Bilbao, Granada, Menorca, Oviedo, Seville, Amsterdam, Brussels, Rome, Lisbon and Venice.

- 2) The beginning of the crisis
  This stage began in 2011 owing to the lost of the essential financial aids, which forced the Airport to cancel most of its destinations. In fact, they only kept functioning the summer flights to Ibiza Island and Menorca. Afterwards, the permanent flight to Palma could be recovered.

- 3) Strategic Table Creation and Future Commitment
  In front of this critical situation, the Catalan Government decided to create the Strategic Table to overcome the Airport's crisis. This group was integrated by the heads of several politic and economic institutions of Lleida, whose objective would be to establish a business plan about both commercial affairs and technic improvements in the infrastructure so as to increase the activity in the Airport. Moreover, the Airport would have the necessary facilities to be able to work outside the Schengen Space.
  Owing to these actions, they managed to establish winter destinations regarding the will of British citizens to ski in the Pyrenees.
  Therefore, during this stage, the active lines were the following: the permanent flight to Palma, the summer lines to Menorca and Ibiza Islands and the winter lines to London, Manchester, Birmingham, Bristol and Belfast. Nevertheless, the expected flights to Russia were not possible because of the delay regarding the Spanish Government permits.

- 4) Schengen Space
  In addition to the improvements obtained through the Strategic Table, it was managed to establish flights out of the Schengen Space. In fact, the Airport started to run flights towards Israel (Tel-Aviv) and, owing to this fact, the cargo transport increased due to the extensions carried out in the infrastructure. In connection with the flights from Tel-Aviv, the *Diputació de Lleida* has developed the project *"Perseguits i Salvats"* according to which four exit routes in the Pyrenees, which were used by Jewish people so as to protect themselves from Nazism during the Second World War, are marked. Therefore, Catalonia has become an interesting place to be visited by Jewish people, taking into account the following main attractions: the Pyrenees, the Aigüestortes

National Park and the Lake of Sant Maurici. For instance, approximately 300.000 Jewish people visit Catalonia each year.

To sum up, as shown in *Table 1*, the Lleida - Alguaire Airport used to offer the following main destinations:

Airline	Destination
Arkia Israeli Airlines	Tel-Aviv
Iberia LAE operated by Air Nostrum	Palma
Iberia LAE operated by Air Nostrum	Mao *(from June until September)*
Iberia LAE operated by Air Nostrum	Ibiza Island *(from July until September)*
Thomas Cook Airlines	London *(from December until March)*
Thomas Cook Airlines	Manchester *(from December until March)*
Thomas Cook Airlines1	Birmingham *(from December until March)*
Thomas Cook Airlines	Bristol *(from December until March*)
Thomas Cook Airlines	Belfast *(from December until March)*

Table 1: Lleida - Alguaire Airport destinations (Diputació de Lleida)

7.6 Some Data of the Lleida - Alguaire Airport

The 5th February 2011, one year after the Airport has opened, 61.769 passengers had used the infrastructure. Therefore, in connection with the 49 Spanish Airports ranking, the Lleida - Alguaire Airport was the 35th most used airport, thus it had more passengers than other airports such as Badajoz, Salamanca, Vitoria, Burgos, La Gomera, Logroño, Albacete, Cordova and Osca. At the beginning of the first year, Vueling offered flights to Palma and Paris, but Paris had to be cancelled. In April 2010, Ryanair started flights to Frankfurt and Milan. Moreover, in summer 2010 Air Nostrum started to offer flights to Ibiza Island and Menorca and during the winter 2010, Pyrenair started connections with Madrid and Vigo for people who was keen on skiing in the Pyrenees. In addition to this and because of skiing, the 26th February they added a route to Lisbon. Therefore, 61.769 passengers used the Lleida - Alguaire Airport during the first year: 57.236 passengers of commercial routes and 4.583 passengers regarding private flights and crew. In relation to the first year, Palma was the most popular destination (28% of the passengers), followed by Frankfurt (25%) and Milan (24%). On the other hand, Barcelona became the less popular destination. Moreover, twelve flights had to be cancelled during the first year: seven flights owing to the Icelandic ash volcano, four flights due to foggy days in the Airport and one flight because of the strike performed by the AENA air traffic controllers.

In connection with the second year (2011), 33.000 passengers used the Airport. Therefore, it was the 41st airport of the Spanish Airports ranking and it had more passengers than other airports located in areas with much more inhabitants, despite of the fact that the Lleida - Alguaire Airport was not earning money from the public financial aids like other Spanish airports were doing. In addition to this, the Airport had lost the flights coming from Russia to get Russian tourists to the Pyrenees because of the Spanish Government delay regarding the permission to operate out of the Schengen Space. Therefore, the companies Ascent Travel and Pegas Touristik had to land in *El Prat* airport.

In 2012, 33.041 passengers used the Airport, thus it obtained the 36th position of the ranking. From the opening until 2012, the Airport had managed 6.312 flights.

In 2013, 29.443 passengers used the Airport, thus it became the 35th airport of the ranking.

In relation to the year 2014, 30.400 passengers used the airport and it obtained the 35th position of the ranking.

Observatori de projectes i debats territorials de Catalunya

8. ECONOMIC EVALUATION OF AIRPORT PROJECTS

8.1 Introduction

It could be thought that applying a cost-benefit analysis to an airport is something different but, in fact, the main issues considered in the economic evaluation of airport infrastructures are also considered in all cost-benefit analysis of major transport investments. Regarding any infrastructure, the main comparison between social benefits and costs and the criteria to avoid errors are quite similar: the definition of the base case, the identification and measurement of relevant effects, the use of appropriate parameter values and the prevention of double or triple counting.
Airport investments are centres of thriving retailing activity and they ought to be assessed as transport infrastructure improvements which have the objective of addressing a demand for transportation. Therefore, the cost-benefit analysis has to consider significantly the impact of the investment on the generalized cost of travel for the users and on the costs of supplying the transportation service, including both airport and airline costs. Moreover, evaluating airport investments in terms of maximizing regional development requires a comparison of the regional impact of the airport investment with the investment in other sectors, such as manufacturing, education or health. In fact, the economic return of the project provides a good indication of the project's impact on the regional economy of Lleida, owing to the fact that the willingness to pay for travel reflects the gross economic benefit generated by the trip. In addition to this, revenues from non - aviation activities such as retailing and land rental for other industrial activities should not be counted as economic benefits resulting from the airport investment. Nevertheless, estimating these revenues is necessary in the appraisal process in order to estimate the financial return of the project and to gauge the necessary adjustments to aeronautical charges in the airport.

In relation to public investments decisions concerning whether a project should be carried out or not, it is required to both identify and measure benefits and costs during the life of the project as well as calculating the net present value of this flow of net benefits.
When evaluating the economic benefits of a project, it becomes essential to define the alternative to the analysed project: the "without project" scenario, which can be divided in two different cases:

- On the one hand, it has to be thought what would happen to the existing infrastructure. Regarding repair projects, the "without project" scenario would be that no further investments are made and thus the airport would progressively degrade into inoperability. In connection with capacity expansion projects, the "without project" scenario would include all the necessary investments to maintain operative the current capacity level.
- On the other hand, the institutional constrains that influence the market have to be considered, thus they could involve government, airport or airline policies. For instance, regarding runway constraints, an airline dominating an airport may not want to increase aircraft size and may prefer to let yields rise instead. Moreover, there could also be environmental constraints, as when there is a cap on aircraft movements below the capacity of a runway.

8.2 Economic Benefits of Airport Infrastructures

When analysing the economic benefits derived from investment in an airport infrastructure, it cannot be related to the revenues obtained by the airport authority and retailing firms with commercial operations in the airport. An airport infrastructure with the aim of meeting transportation demand can be divided in two different areas: landside and airside.
Furthermore, when computing the benefits from an airport infrastructure, there are four issues to be considered: the benefits without or with rationing, the capacity constraint and additional considerations for airside investments. In fact, all these parameters are analysed forwards.

8.2.1 Benefits Without Rationing

In relation to "Benefits Without Rationing", it is considered that the market is competitive and it is not considered neither the service reliability nor the predictability. Therefore, the economic benefit of the investment is computed through the reduction in resource costs. If a project in airport infrastructure produces a reduction in total trip time (τ1-τ0), there is no change in prices and, considering landside infrastructure, *Figure 9* is obtained, which eventually leads to higher capacity.

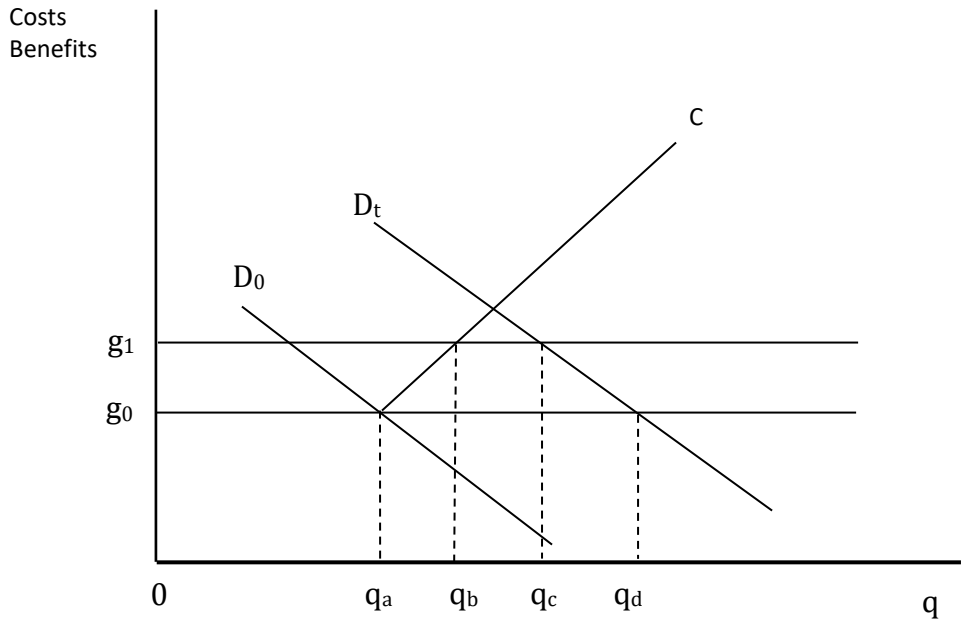

Figure 9: Users Benefits
(Cost - Benefit Analysis of Investments in Airport Infrastructure - José Doramas Jorge)

In relation to *Figure 9*:

- Regarding the y axis, generalized costs and willingness to pay for airport services are considered.
- Regarding the x axis, the demand per unit of time (hour, peak period, day or year) is considered.

The initial capacity allows attending a maximum capacity of qa users per period of time at a constant generalized cost equal to g0. Moreover, the average generalized cost function C shows that once the critical level qa is reached and within the existing capacity, a new increase in traffic is only possible at a higher average cost.
At the beginning, the airport demand considering a particular period of time has an imperfect substitute (such as a less convenient airport or mode of transport) available at a generalized cost of g1 > g0. However, providing that demand is Do, all the users willing to pay the g0 amount will be attended. Considering that growth is expected to be equal to *γ,* the demand in the following period is Q_t. Therefore, depending on the cost considered (g0 or g1), Q_t will be completely attended at the project airport (Qt=qd) or partially at this airport (Qt=qb), with deviated traffic to the second best alternatives (qc-qb) and some deterred traffic (qd-qc). In addition to this and regarding *Figure 9*, the case with the project considers the possibility of maintaining g0 as the generalized cost when demand shifts to Dt (Qt=qd). Nevertheless, the case without the project considers a level of demand equal to Dt too, but an equilibrium demand quantity of qb<qd.
After determining the equilibrium level of demand with and without the project, the economic benefit of the investment project can be analysed. In fact, in connection with *Figure 9*, there are three types of benefits:

- Benefits to existing users (qb): They are equal to (g1-g0)·qb due to the fact that the maximum number of the airport users (qb) is determined by the outside alternative with lower cost than the airport equilibrium with demand D0.

- Benefits from avoided diversion costs (qc-qb): They are equal to (g1-g0)·(qc-qb). Therefore, (qc-qb) passengers will be deviated to less preferred alternatives: regarding time diversion, passengers would be forced to change to less convenient departure times, whereas when mode diversion is applied, passengers would have to use an alternative airport or mode of transport.
- Benefits from generated traffic (qd-qc): They are equal to 0'5·(g1-g0)·(qd-qc). It is necessary to forecast a future demand Qt and this benefit could also be analysed as the deterred traffic avoided owing to the investment. Moreover, additional benefits such as taxes and revenues above incremental costs could be associated with deviated and generated traffic.

To sum up, if benefits without rationing are considered, it is assumed that the number of airport users in equilibrium was determined by the intersection of the average generalized cost function and the generalized cost (g1) of an imperfect substitute, thus the generalized cost at the base case is identical for existing and deviated users.

8.2.2 Benefits With Rationing

When considering "Benefits Without Rationing", two important facts are ignored if compared with "Benefits With Rationing":

- The existence of administrative rationing and different generalized costs for existing and deviated travellers.
- The possibility of insufficient capacity of the infrastructure to meet demand during the project lifetime.

The case considering benefits with rationing is represented in *Figure 10*. In relation to the graphic, generalized costs for existing and diverted users are different. The situation with the project is the same that in benefits without rationing, but the scenario without the project is

different due to the fact that qb is determined through slot allocation and consequently the generalized cost of existing traffic (g') turns to be lower than the second best alternative. Therefore, the generalized cost of deviated traffic is higher than the generalized cost of existing traffic.

When considering "Benefits With Rationing", the following results are obtained:

- Benefits to existing users (qb): They are equal to (g'-g0)·qb, thus lower than without administrative rationing.
- Benefits from avoided diversion costs (qc-qb): They are equal to (qc-qb)·(g1-g0), thus higher than without rationing due to the fact that (qc-qb) is higher.
- Benefits from generated traffic (qd-qc): The same that in the benefits without rationing case.

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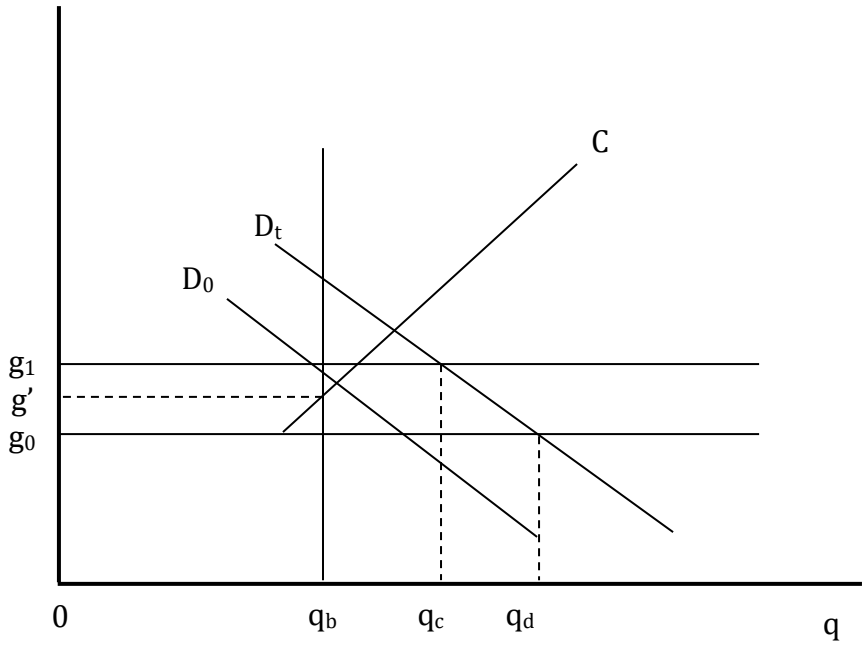

Figure 10: User benefits with administrative rationing of capacity
(Cost - Benefit Analysis of Investments in Airport Infrastructure - José Doramas Jorge)

8.2.3 Capacity Constraint

During the lifetime of an airport it can happen that demand in some year t is above the generalized cost g0 of *Figure 9*. This situation can be shown in *Figure 11*, according to which demand Qt cannot be met at a constant cost g0 but at a higher cost owing to congestion caused by indivisibilities in airport investment.

When considering benefits with rationing and congestion, the benefits are lower than the without rationing case. Moreover, the reduction in the generalized cost of using the airport and the generated traffic are lower too. The generalized cost for existing traffic remains at g', no deterred traffic exists in this case and benefits come from diversion costs avoided, which are equal to (g1-g')·(qc-qb). Therefore, in order to know whether the investment is worth socially, the following issues have to be analysed: time savings for existing passengers, diversion cost avoided and the consumer surplus of generated travel.

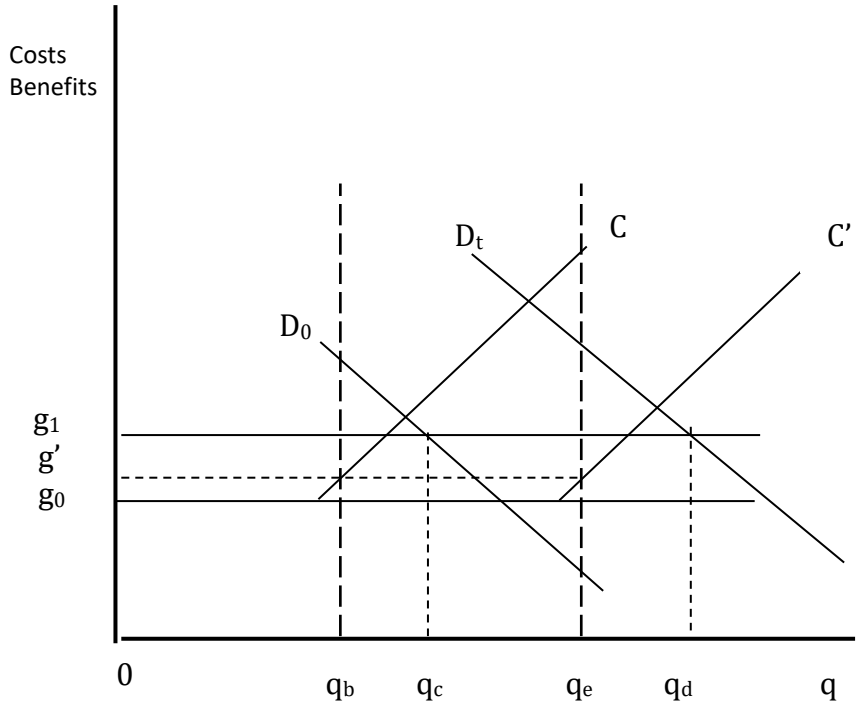

Figure 11: User benefits with administrative rationing and congestion
(Cost - Benefit Analysis of Investments in Airport Infrastructure - José Doramas Jorge)

It has been assumed that the economic effects of the investment are limited to user time savings, hence the producer surpluses of airport authority, airlines and other firms remain constant. Investment in airport infrastructure might change operating costs and revenue of airport authority, airlines and other firms but, due to simplicity, it is assumed that cost reductions regarding airlines benefit consumers through lower prices.

8.2.4 Landside Airport Infrastructures

Landside airport infrastructures are related to the infrastructure before security check points which is necessary to process passengers and cargo. Landside projects aim to expand the airport's capacity to handle passengers and freight, thus they involve expanding the capacity of cargo or passenger terminals, improving access to terminals through better parking facilities or rail stations and improving product quality by using jet ways to access aircraft. The landside investment can prevent traffic from being diverted to alternative travel arrangements that produce additional cost of transportation to the passengers or freight customer; it decreases congestion in terminals, passenger of freight process, thus travel time is reduced and the generalised cost of travel decreases; eventually, passengers' comfort can be improved through investing on jet ways, thus avoiding bus trips or walks.

An airport is an infrastructure that experiences several peaks and troughs of usage throughout its life depending on time of day, day of the week and month of the year. This variability is shown in *Figure 12*, which displays the Flow Distribution curve (FDC) for an airport.

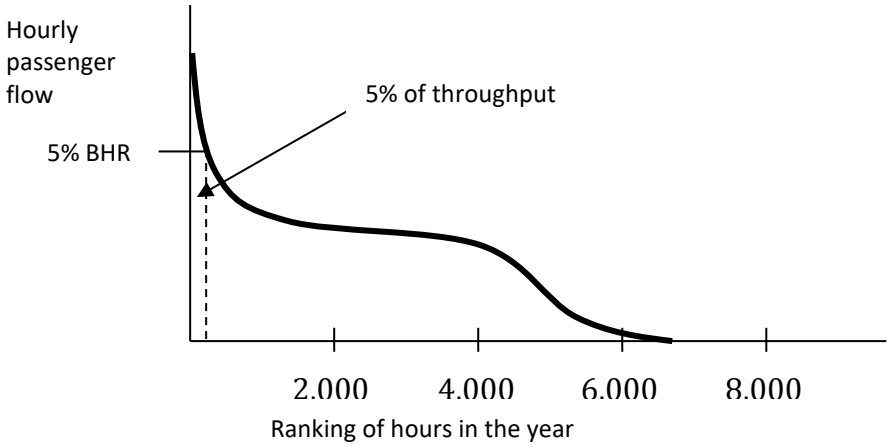

Figure 12: Flow Distribution Curve for a hypothetical airport
(Cost - Benefit Analysis of Investments in Airport Infrastructure - José Doramas Jorge)

The FDC provides an indication of the degree of variability of capacity requirements used in an airport throughout the year, thus ranking all 8760 hours of the year by passenger throughput. Moreover, the pattern shown in *Figure 12* means that the terminal is underused for a significant portion of time. In fact, terminal capacity could be increased by flattening the FDC through pricing policy. For instance, airport charges should differ between peak and off-peak periods. Terminals are designed to be able to process a target hourly throughput with a particular level of service. The main objective is to achieve a balance between the need to handle traffic peaks and the need to minimize unused capacity during throughput troughs. This objective implies that the terminal needs to supply a level of service that is acceptable "most of the time", but "not all the time".

Actually, there is not a single criterion to define the hourly throughput target for a terminal. For instance, *Figure 12* applies a method called "the 5% Busy Hour Rate", which is defined as the throughput level which the 5% of passengers traveling during the busiest hours finds as a minimum throughout level in the terminal. Hence, regarding *Figure 12*, the area under the FDC and left of the doted line represents the 5% of total traffic.

Despite the existence of different methods, the Airports Council International (ACI) and the International Air Transport Association (IATA) have defined a scale of service standards regarding the space available per occupant at several locations in the terminal. These standards are shown in *Table 2*, according to which if the minimum limits imposed by level E were trespassed, the terminal would get level F, considered as "system breakdown". It is important to highlight that the actual capacity of the terminal in terms of passenger throughput per hour is determined by the maximum capacity of the "weakest point" along the passenger processing chain.

	A	B	C	D	E
Check-in queue area	1.8	1.6	1.4	1.2	1.0
Wait/circulate area	2.7	2.3	1.9	1.5	1.0
Hold room	1.4	1.2	1.0	0.8	0.6
Bag claim area*	2.0	1.8	1.6	1.4	1.2
Gov. inspection services	1.4	1.2	1.0	0.8	0.6
Difference to C	35%	18%	0%	-18%	-36%

* Excluding luggage conveyor belt.

Table 2: ACI / IATA Level of service space standard (m^2/pax)
(ACI / IATA)

In connection with passenger diversion, estimating diversion at an airport can be a complex process due to the fact that the required information is not available. In fact, passenger diversion (in time or in mode) varies according to the shape of the FDC at the airport, passenger profile in terms of trip purpose, alternative means of transport available and the schedules of airlines. A general rule to analyse diversion is to consider that a C-level terminal will start experiencing considerable traveller diversion when traffic exceeds design annual throughput capacity by about a third. Hence, regarding *Table 2*, this approximately coincides with the average difference in space requirements between service level C and the lower limit of service level E.

Diversion can be measured in equivalent time terms and its cost is calculated using published value of time estimates. In fact, it can be taken as an approach the average diversion time for all diverted passengers and it is assumed that all diversion will be equally resource consuming and hence should be treated equally. Moreover, the average time could be set at two hours for both diversion in time and in mode, and peak periods in airport activity extend for 1 to 2 hours. Furthermore, in cases of scarcity in which rationing is required, flight schedules would have to be displaced by 1 to 3 hours, thus the average being around 2 hours. Regarding diversion in mode, two hours drive is reasonable as an access or egress time to an alternative airport, or longer travelling time if the trip is realized on an alternative transport mode. The diverted traffic considered is equal to (qc-qb) in *Figure 10* and the two hours worth of passenger time corresponds to (g1-g0) in the vertical axis. This data refers to the difference in generalised cost with respect to the best alternative available to diverted traffic: to an alternative transport mode or airport (diversion in mode) or to an alternative departure time from the same airport (diversion in time). Only when a specific project were considered and it was noticed that the overall cost of diversion would be significantly different for time or mode diversion, and providing that an accurate estimate could be formulated regarding the proportions that each diversion would take, would be reasonable to treat them differently. For instance, one possible case would be when the alternative transport mode implies a very large time penalty on the passenger, such as in islands, in which the two hours assumption would have to be substituted by the time the passenger must invest in traveling on the alternative mode.

Landside quality is related to the quality experienced by the passenger on a terminal, which is influenced by two main factors: congestion in the terminal and the quality of access facilities to aircraft, thus availability of jet ways.

Regarding congested terminals, they produce longer queues and more disruption to the flow of passengers; hence, whereas terminals can handle more traffic than they are designed for until reaching level F of ACI/IATA Table, during the process there are time delays. If there is no congestion data available, a reasonable estimate to actual time penalty is a cost per passenger of 15 minutes worth of passenger time.

There are some projects that are mainly focused on improving both the comfort and the quality of service offered to passengers by increasing the proportion of contact stands in comparison to remote stands, which involve significant investments and do not increase terminal capacity. In fact, passengers willingness to pay for contact stands can be estimated with a value of 5 - 10 EUR for tourist traffic and 10 - 20 EUR for business traffic. Contact and remote stands also differ in type of operating costs involved: while remote stands require bus shuttling, contact stands normally require aircraft towing vehicles, maintenance, lightning and heating of jet ways. Owing to the fact that these costs are similar in magnitude, it can be considered that the difference in costs between remote and contact stands consist only of infrastructure construction costs. Therefore, contact stands are mainly used to increase passengers' comfort, thus when projects involving new terminals do not significantly alter the proportion of contact stands within the airport, it can be treated as a capacity expansion using the same production technology. Nevertheless, if the proportion of contact stands increases considerably, there would be a quality improvement and thus an upward shift on the airport's cost curve.

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8.2.5 Airside Airport Infrastructures

In connection with airside infrastructures, they are related to the infrastructure beyond security checkpoints, where only passengers and authorized personnel can access. It is necessary to process aircrafts. Airside projects aim to increase the capacity of the airport to manage aircraft movements, hence they involve new runways or their widening, taxiways to increase the capacity of existing runways, spare space to expand aircraft parking capacity and air traffic control. The airside investment can produce an increase in the frequency of departure and range of routes from the airport; it would reduce the frequency delay as well as the trip duration, both of them contributing to a reduction in the generalised transport cost; finally, it can speed the processing time for aircraft thus reducing operating costs to airlines.

In relation to airside capacity, it is determined by runways, taxiways and apron space. As with terminals, the actual hourly capacity of an airport's airside infrastructure is determined by the capacity of the weakest of these three levels. In fact, apron space can handle "virtual queues" until taxiways are decongested and, in addition to this, investments aimed to decrease airside bottlenecks could trigger large increases in the ability of the airport to handle aircraft movements.
Improvements in departure frequency can be analysed in terms of changes in frequency delay. In fact, if a new runway was built, it could be used to open a new route. Nevertheless, this can also be analysed as an increase in frequency starting from zero departures and the effect for the passenger could be considered the same as an increase in the frequency of an existing route due to the fact that the passenger wish to depart at the time of the new flight could save him/her from either altering the departure time or from spending waiting time in an intermediate connecting airport. In order to estimate frequency delay, the Douglas and Miller's formula (1974) is used:

$$Fd = 92 \cdot (F^{-0'456})$$

Where: - Fd: Frequency Delay.
- F: Departure Frequency.

In connection with Douglas and Miller's formula, it has to be noted that they noticed that the actual delay is affected by scheduling practices that are not picked in the previous formula. Moreover, they underline that the main aim of the formula is not estimating absolute values of

delay, but rather estimating changes in delay, which are affected by an estimated elasticity of (-0'456).
When analysing an airport, changes in average frequency delay can be computed by referring to the average departure frequency per route in the airport and, in addition to this, frequency delay changes over time will depend on how fast departure frequency increases. In fact, it can be assumed that if movement capacity increases linearly with passenger capacity, the average aircraft size will remain constant and frequency will then increase linearly with traffic.
Nevertheless, providing that the increase in aircraft movement capacity was lower than the increase in passenger capacity, then aircraft size would increase in the long term. Hence, there would be changes in operating costs due to changes in aircraft size, as larger aircraft are cheaper to operate on a per seat basis than smaller aircraft. For instance, when considering a mid-size aircraft such as the Airbus A-320, the average cost per seat per trip would be of 51€. In addition to this, aircraft cost per seat is related to aircraft size by an elasticity of (-0'5).
In connection with airside investments, it is also necessary to consider the impact that changes in aircraft operating procedures have on costs. Changes in aircraft operating costs can result from various sources, including changes in approach traffic patterns (for instance, changes because of foggy meteorological conditions), ground taxiing requirements and turnaround times allowed by the airport. In order to analyse these factors, they can be converted into time savings and then translated into a total cost figure through data on costs per aircraft block-hour. Hence, the suggested criteria is to consider only situations where the project will produce significant changes in aircraft operating costs (for instance, installing a system to improve visibility conditions) and to use an average figure for cost per block-hour which can be easily adjustable in situations where the aircraft operations differ significantly from the average.
In addition to this, it is important to be aware of institutional constraints in relation to the airport and its users which may condition the "with project" and "without project" scenarios. Regarding airside investments, one key concern is whether it is realistic to expect an increase in aircraft size due to the fact that in highly competitive markets airlines may demand more runways as a way to compete on frequency but as an airline can be constrained in terms of number of runways, increasing aircraft size is its only way to be competitive. Hence, when analysing the possibility of building a new runway, it is important to consider the "without project" scenario by capping the extent to which an airline could increase its aircraft size below what would be technically feasible.

Therefore, the main objective of airside investments is to increase the airport capacity regarding the amount of aircraft movements, which has three effects:

- Firstly, it produces an increase in passenger and freight capacity.
- Secondly, it enables an increase in flight frequency, thus benefiting all passengers travelling through the airport. This is owing to the fact that there is a greater choice of departure time and a reduction in "frequency delay" (which is the difference between the passengers' preferred departure time and the nearest departure time available).
- Thirdly, as frequency increases, there can be a change in the average size of aircrafts using the airport, which modifies the airline operating costs due to the fact that larger aircraft are, to a certain extent, cheaper to operate than smaller aircraft.

Regarding runways, the runway capacity does not increase linearly with traffic. Providing that a runway handles more passengers, larger aircraft will have to be used eventually. If a new runway is built, there will be two effects regarding reductions in average aircraft size:

- On the one hand, airlines will compete for time sensitive business travellers by increasing flight frequency with smaller aircraft

- On the other hand, new airlines will enter the airport thus providing new routes also with smaller aircraft.

However, if a new runway is not built, airlines will have to operate with bigger aircrafts so as to handle growing traffic. Hence, when deciding whether to build a new runway or not, it has to be considered the trade-off between a reduced frequency delay at a higher cost per seat if the runway is built (smaller aircraft) and, on the other hand, keeping frequency delay constant at a lower cost per seat if the runway is not built (bigger aircraft). These benefit effects from airside investments are shown in the following *Figure 13*.

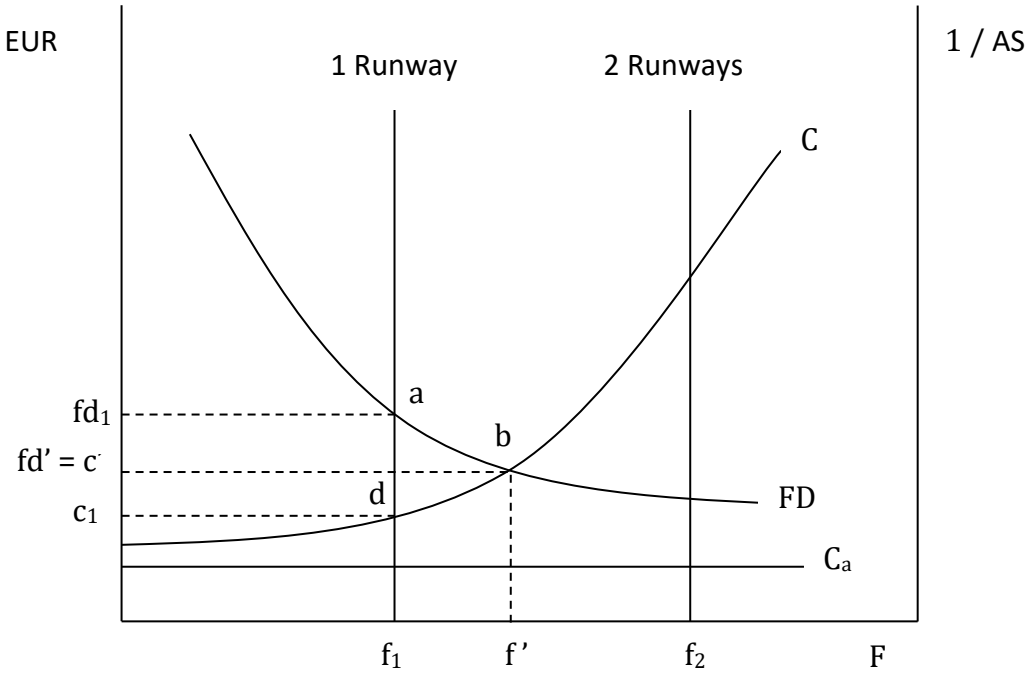

Figure 13: Benefits from airside investment
(Cost - Benefit Analysis of Investments in Airport Infrastructure - José Doramas Jorge)

Hence, the explained trade-off is shown in *Figure 13*, in which the left-hand vertical axis measures currency units (EUR), the right-hand vertical axis represents the inverse of the average aircraft size (1/AS), and the horizontal axis measures departure frequency (F). Moreover, the following parameters are considered:

- FD (Marginal frequency delay schedule): It is the inverse relationship between departure frequency and generalized cost.
- Ca (Marginal airport costs schedule): Constant returns to scale.
- C (Marginal total cost schedule including both airport and aircraft costs): With respect to the right-hand vertical axis, C reflects the inverse relationship between departure frequency and aircraft size, whereas regarding the left-hand vertical axis, C represents the direct relationship between departure frequency and unit cost per seat.

Therefore, if a new runway is built, the capacity for aircraft movements (f_1) increases to a higher frequency (f_2). At f_1 the cost imposed on the passenger by the frequency delay is fd_1, higher than marginal operating costs of c_1. Consequently, airlines have an incentive to increase frequency at the expense of aircraft size due to the fact that passenger willingness to pay for an extra frequency (frequency delay) is higher than the marginal cost associated with reducing aircraft size (which is necessary to increase frequency).

To sum up, equilibrium would be reached at point b, where frequency is f' and the frequency delay fd' is equal to the total marginal cost c'. In addition to this, the benefits of building a new runway, which enables an increase in departure frequency, are equal to the area *abd*. The area *abd*, and thus the benefits obtained through a new runway, increases with time owing to the fact that the passing of time involves a traffic growth (shifting the C curve downwards) and an increase in the value of time with growing income (shifting the FD curve upwards).

To sum up, there are four main benefits derived from airside and landside projects:

- Reductions in travel, access and waiting time.
- Improvements in service reliability and predictability.
- Reduction in operating costs.
- Increases in traffic.

9. SUMMARY OF THE INTERVIEW TO THE LLEIDA-ALGUAIRE AIRPORT'S DIRECTOR

In connection with the interview carried out to the main director of the Lleida - Alguaire Airport (Mr Antoni Serra), it can be pointed out that the commercial department of Aeroports de Catalunya manages the destinations that the airport offers and their schedules. The airport has an agreement with AirNostrum and, in fact, flights towards the Balearic Islands are worth offering due to the fact that people cannot get there by driving their own car. For instance, the flight that connects Lleida with Palma de Mallorca is worth having due to the students who are interested in the University of Lleida (UdL). Moreover, the flights that join the airport with Ibiza and Menorca function appropriately because of the amount of people willing to go there in summer.

AirNostrum offers several types of aircraft depending on the amount of passengers: from ATR-72 to CRJ, which can handle from 40 passengers up to 100 passengers. In fact, using larger aircrafts, such as an A-320 of 180 seats, is very difficult to commercialize and implement due to the fact that Barcelona's airport is relatively close and it offers a larger amount of different destinations and schedules. In addition to this and regarding commercial flights, the aircrafts that come from Mallorca at the beginning of the season already come with passengers.

In the Lleida-Alguaire Airport, once a plane has landed, it takes 4 minutes to reach its final stop position (from the instant when its wheels touch the runway until the crew stops the aircraft's engines). Nevertheless, this time also depends on the characteristics of the plane owing to the fact that larger aircrafts weight more and they need more time to brake and stop; in this case, it would take 6 minutes to reach the final stop position. Therefore, it can be assumed that there are no large distances in the Lleida-Alguaire Airport.

One particular issue of the airport is that its maximum capacity depends on the boarding gate. Hence, regarding the boarding gate, the maximum capacity of the airport is between 2 and 4 aircrafts per hour. If small aircrafts have to be attended, it is possible to board one small aircraft each half an hour; as there are two boarding gates, it is possible to board 4 small aircrafts each hour. When bigger aircrafts are considered, such as Airbus A-320 of 180 passengers, the airport's maximum capacity only enables to board 2 aircrafts each hour.

In fact, in spite of the fact that the airport has a parking area for 5 aircrafts and a runway capacity that is able to manage up to 8 and 9 aircrafts per hour regarding air transit control, the capacity of the whole airport is strongly limited by its boarding gates.

As broadly known, the area of Lleida is usually affected by fog, which is a meteorological phenomenon that can damage the air transit of the Lleida - Alguaire Airport. According to the current director of the Lleida - Alguaire Airport, the number of days that the infrastructure is affected by fog depends on the year and varies from 2 to 3 foggy days per year. Hence, an

average of 2’5 foggy days per year can be assumed. Nonetheless, regarding the period 2016 - 2017, there have been 4 foggy days, which is a scenario that hardly ever occurs.
It has to be noted that when assuming an average of 2’5 foggy days per year, it means that, in an average of 2’5 days per year, aircrafts that were expected to land in the Lleida - Alguaire Airport had to be deviated towards another airport because of safety reasons related to fog but, in fact, there have been more than 2’5 foggy days per year.
In relation to the procedure that has to be followed so as to decide whether an aircraft can land safely or has to be deviated is the following: the airport has an Instrumental Landing System (ILS) of Category I, which leads the aircraft towards a height of 60 metres. According to the Airport’s director, the mentioned ILS is appropriate for Lleida in connection with fog and, in fact, regarding the period 2016 - 2017, only one aircraft had to be deviated owing to the incompatibility of the ILS and the amount of fog that affected the Lleida - Alguaire Airport that day.
As aforementioned, in winter, the Lleida - Alguaire Airport manages charter flights so as to bring skiers from the UK to the Pyrenees and, in addition to this, these charter flights are operated through big aircrafts such as the Airbus A-321. In fact, regarding charter flights, they are not commercialized by selling tickets but it is the main company which sells a whole pack of hotel, ski passes, food, insurance and airplane tickets. Hence, the client is completely managed by the tour operator, which in this case is Nielsen.
In connection with Nielsen, it manages an agreement with several air charter companies such as Thomas Cook, Fly B or Germania so as to bring English tourists to the Lleida - Alguaire Airport. Therefore, the main responsible organization of all these tourists is Nielsen. Moreover, owing to this fact, Nielsen has to manage a solution to overcome some specific scenarios, such as the foggy days that might be affecting the Lleida - Alguaire Airport. in relation to this, the procedure to be followed according to Nielsen is the following: on Sunday morning, the Nielsen bus carrying all the English skiers back to the Lleida - Alguaire Airport stops at Pons so as to let both the passengers and the main bus driver rest. Hence, between 5:00 h and 5:30 h in the morning, the tourist guide that is travelling with the tourists calls the Lleida - Alguaire Airport and asks for the meteorological forecast. In fact, two meteorological forecasts are carried out: one is realized by the main airport and the other one is carried out by an external company. Hence, depending on the meteorological forecast carried out at 5:15h - 5:30 h in the morning, Nielsen evaluates whether there might be problems to take off or not.
In relation to fog and according to the meteorological forecast, if Nielsen considers that an aircraft could not be able to land or to take off safely, both the passengers and the airplane are automatically led to Reus. According to the airport’s director, if the airplane tried to land at the Lleida - Alguaire Airport, it would succeed but when Nielsen orders to have the airplane landed at Reus, it does not make the approximation procedure to the Lleida - Alguaire Airport.
Therefore, Nielsen’s decision is mostly based on the level of risk due to the fact that if the tourists coming from Andorra where brought to the Lleida - Alguaire Airport and eventually, because of fog, the airplane was not able to land at the airport, it would have to land in Reus. Moreover, the airplane could be landing in Reus within 10 minutes, whereas Nielsen would need at least 2 hours and a half to both bring and board all the tourists towards Reus Airport. Finally, owing to these consequences, the airplane would take off towards the UK with an approximate 4 hours delay, approximately. Furthermore, if meteorological conditions related to fog affected the incoming flight, English tourists would have to wait Nielsen’s buses that would have to go from Lleida to Reus, thus they would get to Andorra with an approximate 5 hours delay. In addition to this and because of the delays, the air company would have to change the pilots, the cabin crew and perhaps the aircraft, too. As a summary, this extraordinary scenario caused by fog would produce such an enormous logistic, time and economic trouble that Nielsen is not willing to afford it.
Consequently, in order to ensure that Nielsen remains as the main tour operator investing in the Lleida - Alguaire Airport and that the charter air companies agree to fly for Nielsen again,

the Lleida - Alguaire Airport has developed a procedure according to which Nielsen's tour guide calls the Lleida - Alguaire Airport from Ponts at 5:00 h in the morning and if the meteorological forecast establishes that there is 60% of risk that airplanes could not be able to land appropriately, they are automatically set to Reus and, in addition to this, most of the Lleida - Alguaire Airport's staff is also set to Reus so as to provide the tour operator with some assistance.

It has to be noted that if a regular flight cannot land in the Lleida - Alguaire Airport and thus it has to land in Reus, as it is a *regular flight*, passengers have to look for their own alternatives and perhaps the air company would pay them some of the transport costs; nevertheless, *charter flights* also include other services such as bus transport or coordinating check-ins and check-outs in hotels. Therefore, everything is perfectly organized in charter flights and, consequently, any extraordinary situation, as the delays related to foggy conditions, would cause huge problematic effects.

In order to overcome the problems caused by fog, an improved fog system should be installed. Nevertheless, according to the Lleida - Alguaire Airport's director, investing in a new fog system of higher category would not be profitable due to the fact that the current fog system of the airport is completely appropriate in relation to the flights that have to be attended. In fact, the system available in the Lleida - Alguaire Airport is category I "plus" owing to the fact that a category I fog system is being used within a 61 metres wide runway which has a central light axis that enables the pilots to reach a lower height than if they had to deal with another runway without the central light axis.

According to the Lleida - Alguaire Airport's director, if a category II or III fog system had to be installed, a huge economic investment would have to be done and, taking into account that improving the system category would let the pilots reach a lower height but it would not ensure that aircrafts are able to land in case of foggy conditions, it would not be profitable. Furthermore, fog is a variable meteorological phenomenon due to the fact that it could happen that there are 30 metres of visibility during thirty minutes and that, subsequently, there are 6 km of visibility. Due to this fact, according to the Airport's director, investing in such a variable factor would not be profitable for the infrastructure.

In fact, 90% of the airplanes have been deviated to Reus not because it was impossible for them to land in the Airport but because of Nielsen's criteria to avoid possible logistic risks. Actually, the charter flights operating in the Lleida - Alguaire Airport come from the UK, where pilots are very used to both take off and land despite possible bad weather conditions.

Therefore, according to the Airport's director, the current ILS system suits perfectly the airport's demand, thus increasing the ILS to category II - III would not be profitable due to the fact that mountains would have to be cut, the power plant would have to be changed, the lightning facilities would have to be improved… In fact, regarding the interview, the director stated the following: *Si depèn de mi, mai diré que s'ha d'instal·lar un ILS de categoria superior a l'actual (If it depends on me, I will never state that the airport needs an ILS of higher category).*

In connection with the profit and loss account of 2014, high "other exploitation expenses" can be observed. Actually, an airport has several exploitation expenses, which include the airport management so as to maintain the different facilities up to date and the fire system working. For instance, according to the Airport's director, the railings that dine the path of the ILS have to be changed. One the one hand, these railings are necessary so as to ensure that nobody can enter the airport without being appropriately authorized and, on the other hand, these railings have to be frangible owing to the fact that, in case an aircraft had an accident and went out of the main runway, it would have to be able to break the railings. Hence, as an example of "other exploitation expenses", each of the railings costs approximately 60.000 € - 70.000 €, since each of the railings has to be certified. In fact, managing an airport is quite similar to managing a farm in spite of the fact that, when managing an airport, costs are higher due to the fact that all its facilities must have their own safety certificates.

Despite the fact that most of the airports around the world use their parking areas so as to make money, one particular characteristic of the Lleida - Alguaire Airport is that it does not use the parking area to make economic benefits. Actually, as the Airport's director assumes in the interview, the Lleida - Alguaire Airport is not like the other ordinary airports; regarding commercial aviation, it only works on Friday and Sunday and if clients had to pay the parking for just two operating days, they might decide to use another airport. As the Airport's director assumes in the interview, the Lleida - Alguaire Airport is not functioning at its maximum capacity every day so as to have the aim of producing as much benefit as possible. In fact, the airport is still within its start up and, according to its marketing polices, several attractions such as free parking area are offered. It is necessary to take advantage of the main characteristics of the Lleida - Alguaire Airport.

In relation to the profit and loss accounts of other years, they do not vary a lot due to the fact that there has not been any significant structural modification since the Airport opened in 2010.

According to the Airport's director, the main function of the Lleida - Alguaire Airport is not to make money but to perform as an important platform so as to attract foreign enterprises in Lleida and create new businesses.

Regarding freight transport, nowadays the Lleida - Alguaire Airport is not being used as a platform in which cargo transport is realized and, in addition to this, the current director of the airport is not keen on developing freight transport in the infrastructure. In fact, at the beginning, the Lleida - Alguaire Airport was designed in order to promote freight transport. Hence, it can be observed that, when regarding the airport, there are two different areas: on the right, there is an area for passengers and, on the left, there would be the cargo area. It was the very initial design: regional commercial flights and cargo. Subsequently, a bigger runway had to be designed because of several reasons: for instance, the organization Virgin Galactic was keen on setting the Lleida - Alguaire Airport as the South European Base so as to enable the taking off and landing of the aircraft that was going to fly throughout the stratosphere and travel around the world. Hence, owing to this fact, the runway was widened up to 61 metres wide, even wider than the Barcelona Airport's runway. Nonetheless, a unique boarding gate remained in the design, thus the average capacity of the airport was to board one aircraft every hour or 45 minutes.

Afterwards, the Lleida - Alguaire Airport managed an agreement with several charter air companies, owing to which the airport would have to board three airplanes of approximately 228 passengers at the same hour. However, this situation was not possible to manage with a unique boarding gate of 50 passengers. Furthermore, these agreements were obtained when the Generalitat Government had no money to invest, thus the Generalitat asked the Lleida - Alguaire Airport to design a solution, as cheap as possible, to attend the tour operators' demand.

Due to this situation, the area that had been initially designed for freight transport was converted into the arrivals area. In connection with the departures area, it was decided to buy or rent a tent, inside which the necessary boarding facilities would be installed. Therefore, the airport would have two different boarding gates that would enable the airport to attend two flights of 220 passengers each. Moreover, a further tent was installed so as to have a checking area with 6 counters, as in the main terminal there was only space for 4 counters. Hence, the airport was modified so as to be able to attend three charter aircrafts without any significant investment.

Providing that freight transport was eventually carried out, another tent could be installed so as to manage the cargo. In relation to the required infrastructure, it would be necessary to install a cold storage, a sanitary area, a customs' pif, a cargo pif and freight staff. In addition to this, it would be necessary to attend law issues of customs, Spanish State treasury and ranch. Hence, several facilities and a significant investment would be required so as to begin freight transport in the Lleida - Alguaire Airport.

In fact, in addition to the required facilities, it would also be necessary to analyse whether freight transport would be profitable or not in the airport. Therefore, it would be necessary to carry out a benchmarking exercise around Lleida so as to know the available market of fruit, vegetables, meat, oil, pork… In fact, from a basic point of view, it can be stated that the average cost of transporting 1 kg of cargo by truck is 0'80 € - 1'00 €, thus 1 kg of cargo can be transported for a relative low specific cost. Nonetheless, the used truck might have some trouble so as to find some cargo with which return. Providing that airfreight transport was established, a big cargo aircraft such as 777, 340, 3030 or Jumbo would be required, as Zaragoza has so as to transport Zara's clothes. Nevertheless, such a big aircraft does not fit in the current Lleida - Alguaire Airport and, owing to this fact, it would be necessary to broaden several facilities such as the platform, the taxiway and the runway. Moreover, as aforementioned, it would be necessary to analyse which cargo would the aircraft bring back to the Lleida - Alguaire Airport, since cargo aircrafts do not admit empty legs as charter aircrafts do. It has also to be considered that fruit is not very expensive when commercializing, whereas the functioning cost of a cargo aircraft is significantly expensive.

Taking these facts into account, is it really necessary to use aircraft transport? In fact, according to the director of the Lleida - Alguaire Airport, it would be much better to use a truck so as to bring the cargo towards Amsterdam, where it could be loaded into a large amount of cheap freight aircrafts. Actually, the cost of transporting 1 kg of fruit through aircrafts from Lleida is significantly high and, in addition to this, the cost of building a new freight terminal would have to be considered. Consequently, none of the fruit traders of the area of Lleida would be able to assume such a cost increment in order to transport 1 kg of fruit.

According to the director of the Lleida - Alguaire Airport, providing that no investment was available, a small tent could be installed so as to promote air freight transport within Europe, thus none custom pif would be required (if the UK was the cargo's destination, the airport would require a custom pif). Moreover, several facilities such as sanitary controls and cargo management machines would be necessary.

Therefore, taking into account that within Europe there is a large amount of truck transport companies that offer really competitive low prices in comparison to airfreight transport companies, fruit traders would only accept to use airfreight transport if it was subsidized by the administration.

Nonetheless, according to the director of the airport, one possible way to demonstrate and promote the competitiveness of airfreight transport from the Lleida - Alguaire Aiport would be to consider high value cargo: for instance, it might be profitable to use airfreight transport so as to transport 1 kg of a specific product which value was 300.000 €. Another example would be related to the trading of tuna, which could be fished in the morning and unloaded at Tokyo just after 24 hours. Consequently, a significantly high value of the transported cargo might justify the high cost of any transport operation, such as the transport of human organs.

Nevertheless, another possible trading business would be to transport packages instead of huge amounts of cargo, which the current airport would be able to attend.

In connection with passengers transport, it can be stated that the Lleida - Alguaire Airport has three main categories of users, which are the following: skiing tourism, beach and islands tourism and some tourists who come from Tel - Aviv.

Regarding the commercial flights that join Tel - Aviv with the airport of Lleida - Alguaire, they are charter flights which operate every Friday from December until March through the air company Arkia.

In connection with the flights that join the Lleida - Alguaire Airport with Eivissa and Maó, they are operated during the summer, from July until September, and regarding the flights that join the airport of Lleida - Alguaire with Mallorca, they are available all the year.

When analysing the Lleida - Alguaire Airport economically, it can be stated that the infrastructure requires a greater amount of transport operations so as to become financially profitable. According to the director of the Lleida - Alguaire Airport, some of the future

strategies that could be useful to improve the current airport's situation are the followings: industry, logistics, technology and education. In addition to this, the airport is being advertised in order to host several courses for drones' pilots, develop new aeronautic techniques and store old aircrafts such as Terol. Moreover, it could also provide hangars to have aircrafts fixed, painted, cleaned and appropriately maintained. Therefore, the current director is very interested in providing several training courses regarding pilots, mechanics and hostesses, as well as in providing the airport's facilities to promote drones developing, hot - air balloons and electric automatic cars. The current director provides the facilities of the Lleida - Alguaire Airport so as to develop any kind of activity that cannot be carried out in other more crowded airports, such as the Barcelona Airport.

In relation to pilots and taking into account that living in Lleida is cheaper than living in Barcelona, the Lleida - Alguaire Airport also offers the broadly known *base training* due to the fact that pilots must have a certificate for each specific aircraft they work with. Obviously, pilots want to take the base training at the cheapest available price and, due to this reason, they go to several countries such as Polonia or Romania, where this training course is cheaper. In relation to the base training, the director of the Lleida - Alguaire Airport has computed the costs involved in offering base training as well as a little margin so as to have benefits and, subsequently, he has offered it to several aircompanies such as Vueling, AirEuropa, Evelop, Iberia or AirNostrum. So far, owing to the fact that Lleida is 10 minutes away from Barcelona by airplane, Vueling has accepted the offer and thus Vueling pilots are currently taking their base training course in the airport of Lleida - Alguaire and, in addition to this, they are taking the course for a cheaper price if compared with taking the same course in the airport of Barcelona.

In relation to private flights, last year the airport was closed at 17:00h so as to reduce costs but, in fact, during the summer, private pilots start flying at 16:00h so as to avoid significantly high temperatures. Consequently, as they were keen on start flying at the time when the airport closed, they abandoned the Lleida - Alguaire Airport.

Owing to this reason, the current director has decided to have the airport opened from 9:00 h in the morning until 20:30 h in the afternoon, when the sun goes down and private pilots stop flying. Nevertheless, the current director has to manage this increase of opening hours without increasing the annual costs of the airport. Due to this fact, some administrative officers haven been trained so as to be able to manage aircraft operations, thus it is not necessary to pay more employees.

Furthermore, the director has invested in building an anti-drones antenna so as to make the Lleida - Alguaire Airport as the main world reference regarding this issue.

Finally, the airport has also performed as the main platform to record several commercial advertisements and, actually, according to the director of the airport, the benefits that the infrastructure obtains from recording advertisements are significantly high.

Therefore, all theses activities are carried out in order to ensure that the airport has an appropriate financial performance and so as to provide the surrounding citizens with jobs.

Along the interview, the director was asked about how the high-speed train AVE could influence the Lleida - Alguaire Airport. In relation to this issue, the director stated that the airport was not affected by the mentioned high-speed train due to the fact that the air transport process is only profitable regarding specific minimum distances or to connect with islands, where it is difficult to go by car. Actually, the road which joins Lleida and Madrid is not long enough to prefer the air transport instead of the road transport.

In addition to this, the Lleida - Alguaire Airport's director also stated that the airport of Andorra - la Seu d'Urgell cannot compete against the airport of Lleida - Alguaire owing to the fact that their business policies are different.

Regarding the flights which bring English tourists to Andorra through the Lleida - Alguaire Airport, they are charter flights. Hence, at the beginning of the season, the aircraft flies from an airport of the United Kingdom towards the Lleida - Alguaire Airport transporting English

tourist; nevertheless, the aircrafts leaves the Lleida - Alguaire Airport with no passengers on board. This is broadly known as performing an "empty leg", thus the aircraft flies with no passengers towards the airport where it is needed. In fact, regarding the flying costs of charter flights, empty legs are already assumed both at the beginning and at the end of each season, since at the end of the skiing season the aircraft lands at the Lleida - Alguaire Airport with no passengers on board and takes off full of English tourist that are willing to get home.
Whereas aircraft companies get benefits from the passengers, the airport makes benefits from airport taxes. Furthermore, the airport does not get benefits from empty legs as it only charges the respective airport taxes.
In spite of the fact that charter aircraft companies work with empty legs, regular air transport companies do not have empty legs in their policies, since they are keen on commercializing all their flights.
Regarding a new available in the Lleida's Newspaper, it was stated that citizens who live near the Lleida - Alguaire Airport had been surprised because of the noise produced by continuous flying exercises carried out by Vueling pilots. Nevertheless, according to the airport's director, both the structure and the design of the Lleida - Alguaire Airport are very good. In fact, in spite of its small size if compared with other airports, it was awarded as one of the tenth most beautiful airports of the world.
The Lleida - Alguaire Airport is also environmentally integrated within the area and there are no problems regarding noise due to the fact that the amount of citizens living near the airport is significantly small. Nevertheless, regarding the airport of Barcelona, there are lots of environmental problems because of the high level of noise that aircrafts produce.
To finish, the importance of knowing the opinion of the airport's users has to be noted. According to the director, when the airport opened, a benchmarking analysis was carried out around Lleida - Alguaire in order to know which was the main destination that citizens would like to have in their airport. According to the realized survey, Paris was the preferred destination but, after 4 months from the first flight towards Paris, this route suffered a notorious decrease due to the fact that most of the people that wanted to visit Paris had already been there. In addition to this, there was just one available flight to go to Paris, which used to leave on Friday and return on Sunday, whereas citizens might prefer travel from the airport of Barcelona, which offers a larger amount of flights' schedules.

Own elaboration

10. ANALYSIS OF THE LLEIDA - ALGUAIRE AIRPORT

10.1 Introduction

When evaluating an infrastructure, the main factors to be considered are the following: the cost-benefit analysis, the macroeconomic impact and the evaluation of those aspects that cannot be monetized currently.
The activities related to both transport and mobility are very important not only for the citizens' welfare but also for the economic and social development of each country. In fact, in the Emerson report of the European Union it was stated that the long-term competitiveness of any economy only depends on the amount of infrastructure facilities provided. Hence, infrastructures and transport services have an outstanding effect: they improve the accessibility of people to the labour market and other areas, they increase the productivity of those companies which have to move their products, they create new opportunities and, to conclude, they allow to decrease global inefficiencies by reducing the transport cost of both people and cargo.

Nevertheless, it does not imply that any transport project is worth being developed. The economic efficiency increases by constructing only infrastructures that will resolve accessibility and mobility problems with social benefits higher than their own costs. Nevertheless, the development of new infrastructures can also produce environmental and social damages. Infrastructure opportunity costs are particularly high specially when public resources are low (assuming that the best choice is made between several alternatives, the opportunity cost is defined as the cost incurred by not enjoying the benefit that would have been had by taking the second best available choice). In addition to this, environmental and social issues are very important in relation to infrastructures and the extent to which society influence investments' decisions is increasing continuously. Therefore, it is important to evaluate public investments related to the infrastructures' field so as to achieve the following objectives:

- Improved efficiency when using public resources.
- Guarantee both social and territorial equity as well as objective evaluations.
- Transparency in relation to the processes of decision.
- Increase infrastructure investments from private agents.

When analysing an infrastructure project, it can be divided in the following three different areas: socioeconomic evaluation (cost-benefit analysis), macroeconomic evaluation and the evaluation of non-monetized criteria. These parameters are explained forwards:

- Socioeconomic evaluation: It is carried out through a cost-benefit analysis, which consists on defining and assessing the costs and benefits that society obtains from a specific project; hence, the cost-benefit analysis provides a quantitative evaluation. For instance, investment and maintenance costs and environmental impacts would stand as costs, whereas reduced travel time and safety improvements would stand as benefits. Once costs and benefits are defined, they can be monetized and thus a profitability evaluation can be carried out. In fact, in relation to transport infrastructures, the financial profitability is not analysed but the socioeconomic one is, thus reflecting society welfare improvements from a transport investment. In spite of the fact that socioeconomic evaluation is really significant, some criteria related to social welfare and environmental impact cannot be included in a cost-benefit analysis.
- Macroeconomic evaluation: When a transport investment project is going to be realized, it influences the economic growth and employment both during its construction and long-term functioning. Once the construction process is finished, the new infrastructure will have economic influence throughout the area, affecting local productivity and achieving new business ideas. Hence, when analysing a specific project it has to be considered its influence on local productivity and territorial future possibilities.
- Evaluation of non-monetized criteria: It is necessary due to the fact that there are several parameters that are difficult to evaluate monetarily. Hence, this group includes factors difficult to monetize related to territory (barrier effect or urban growth), environment (noise, visual impact and fauna barriers) and society (income distribution and services offered to citizens). For instance, nowadays it is possible to analyse the environmental cost of generating $C0_2$ and thus evaluate its impact towards climate change. Therefore, the cost produced when constructing a new infrastructure due to the fact that the soil used cannot develop anymore its environmental functions can be monetized.

Furthermore, regarding transport infrastructures, one of the most important parameters is the treatment of uncertainty owing to the fact that the used evaluation processes are based on variables that have some uncertainty. In connection with transport infrastructures, uncertainty is due to two main factors:

- On the one hand, it is difficult to determine precisely the expected demand, owing to the fact that transport demand evolution is forecasted through models that are no more than a simplification of reality, both considering the reference or the new scenario.
- On the other hand, investment costs are uncertain, especially when big projects are considered. Nevertheless, uncertainty can be reduced when the soil is better known, the environmental impacts are defined and the works are scheduled.

In fact, in order to deal with uncertainty, it is worth investing enough on analysing demand and adopting risk control mechanisms in relation to the work execution so as to avoid too many costs and delays. For instance, a sensitivity analysis can be performed, which consists on computing changes in the evaluation project's results when some parameters are modified by an increase or decrease. Moreover, if the sensitivity analysis varied significantly when some parameters were modified, probably the project would not achieve acceptable results, thus it would undergo an important uncertainty risk.

In connection with the socioeconomic evaluation of the Lleida - Alguaire Airport, it is carried out through a cost-benefit analysis (CBA), which consists on quantifying monetarily both benefits and costs that the development of the new project will cause among society.
Therefore, the CBA enables to prioritize spending proposals in connection with efficiency and ensures an efficient use of the available sources.

In addition to this, it is important to consider the difference between economic and financial profitability:

- On the one hand, economic profitability is related to the CBA and to the following question (asked from a social point of view): Should the project be carried out?
- On the other hand, financial profitability analyses the project capability to produce enough benefits to cover costs, thus it is related to the following question: Is private participation possible?

Guia per a l'avaluació de projectes de transport, Mcrit, 2010

10.2 Analysis of the demand

As aforementioned in the theoretical part, the main objective of the investment consists on building a new regional airport for commercial aviation in order to deal with the touristic demand of the area. In fact, the activity related to tourism has experienced a considerable increase in the last years owing to the fact that mountain attractions such as Andorra or the Pyrenees are very close to the infrastructure. Furthermore, the new airport would have positive impacts to the surrounding area by improving its local economy and widening the touristic market.
The area where the Lleida - Alguaire Airport is located has no other similar infrastructure nearby. In fact, before the airport was built, all the trips (that is both the foreigners that were travelling to the mountain area or the local citizens that were travelling abroad) had to be carried out through the international airport of Barcelona, which is located within the area but 160km away from the Lleida - Alguaire Airport. In fact, when computing the average distance between each airport and the mountain area, the following values are obtained (*Table 3*):

Trip	Average Distance
Barcelona Airport to Mountain Area	200 km
Lleida-Alguaire Airport to Mountain Area	150 km

Table 3: Average distance between each airport and the mountain area (*Own elaboration*)

Therefore, the Lleida-Alguaire airport enables to reduce up to 50 km the distance between an infrastructure and the main mountain area.

It is also interesting to analyse how the trips between the two airports and from an airport to the mountains are realized. This is shown in the following table (*Table 4*):

Trip	Mode
Between Barcelona's and Lleida's airport	By motorway
Between Lleida's airport and the mountain area	By road
Between Barcelona's airport and the mountain area	By motorway and road proportionally

Table 4: How the trips between airports and mountains are realized (*Own elaboration*)

In connection with demand, the number of passengers that have used the Lleida-Alguaire airport is not constant throughout the years. In fact, this variation is shown in the following *Table 5* and *Figure 14*:

Year	Passengers that used the airport
2010	61.769
2011	33.000
2012	33.041
2013	29.443
2014	30.400
2015	30.200
2016	32.900

Table 5: Demand evolution (2010/16)

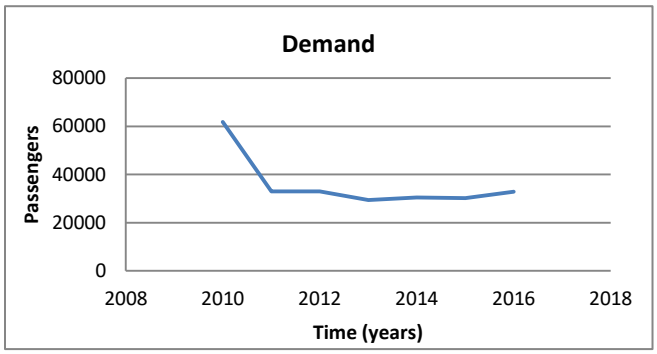

Figure 14: Demand evolution (2010/16)

As indicated in the *Table 5*, the year when the airport was opened, in 2010, 61.769 passengers used the infrastructure. Hence, among the 49 airports that function within the Spanish territory, the Lleida-Alguaire airport became the 35th most used airport, thus beating other airports such as the one in Badajoz, Salamanca, Vitoria, Burgos, La Gomera, Logroño, Albacete, Cordova and Osca.

The second year, in 2011, 33.000 passengers used the infrastructure. Therefore, despite the decrease, it was the 41st most used airport within the Spanish territory and it beat other airports which function in much bigger areas. In connection with the decrease in the number of passengers that the airport suffered in 2011, as aforementioned, it has to be considered that the Lleida-Alguaire airport lost the public economic aids that other airports had and, in addition to this, the airport also lost flights from Russia due to the fact that the Spanish Government delayed the airport's permit necessary to operate out of the Schengen space.

In connection with 2012, 33.041 passengers used the airport; hence, it became the 36th most used airport of the Spanish ranking.

Regarding 2013, the infrastructure was used by 29.443 passengers and the airport was the 35th most used of the Spanish territory and, in relation to 2014, 30.400 passengers used the Lleida-Alguaire airport and it became the 35th most used one.

Therefore, as can be shown in *Figure 14*, the number of passengers that have used the Lleida-Alguaire airport from 2010 to 2016 varies quite a lot each year. Therefore, in order to be able to analyse a 30 years period (2010-2040) and being optimistic, we assume that from 2017 to 2040, the number of passengers that use the airport each year suffers an increase of 3% regarding the year before. Hence, the following graphic (*Figure 15*) regarding the evolution of demand is obtained:

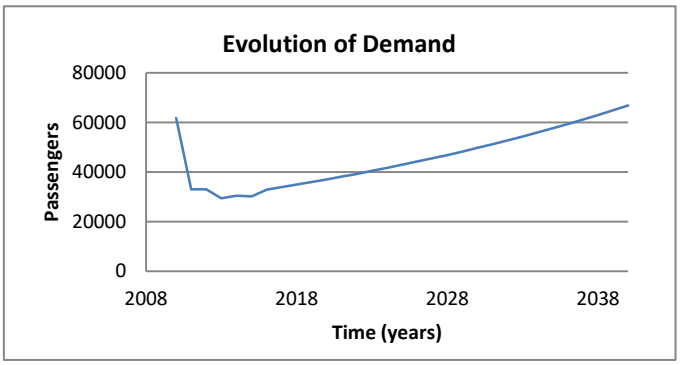

Figure 15: Predicted demand evolution 2010/2040 (*Own elaboration*)

In fact, an optimistic increase of 3% has been assumed owing to the fact that it is the average variation that can be observed within the period 2010 - 2017.

10.3 Financial Analysis

In connection with the Financial Analysis of the Lleida - Alguaire Airport, as recommended, it has been carried out for a period of 30 years, thus from 2010 to 2040. Moreover, it has to be noted that this project is only based on the "Profit and Loss Account of 2014" (which can be found in Annex 3) owing to the fact that it is the only financial analysis available in the official website of *Aeroports de Catalunya*.
Therefore, in order to overcome this lack of information and as explained forwards, some of the profit and loss account's items have been estimated depending on the amount of passengers that used the infrastructure each year and, in addition to this, it has been assumed that most of the items remain constant throughout the analysed period of time.
As the Lleida - Alguaire Airport's director Mr Antoni Serra stated in the interview, the profit and loss accounts vary very little from one year to another due to the fact that none significant structural modification has been carried out in the infrastructure since it was inaugurated in 2010.
Hence, the different items of the profit and loss account have been set as follows:

- Investment:
  As aforementioned, the Lleida - Alguaire Airport had an initial investment of 90 millions euros and it was managed by the Generalitat de Catalunya. As can be shown in Annex 3, it is only considered as a cost in the first year of the analysed period of time.

- Residual Value:
  In relation to the residual value of the infrastructure, it is considered as an income in the last year of the analysed period of time (Annex 3)
  Hence, lineal amortization has been applied in order to compute the residual value of the airport, which usually has 50 years of lifetime and has been analysed for a period of time of 30 years. Therefore, the following computation has been carried out, assuming the aforementioned investment of 90 million euros:

$$Lineal\ Amortization: \frac{90.000.000\ €}{50\ years} \cdot (20\ years) = 36.000.000\ €$$

- Net import of the business revenue:
  As aforementioned and from an optimistic point of view, a 3% increase of passengers per year has been considered. Hence, it has been assumed that the item *Net import of the business revenue* varies 3% from the previous year owing to the fact that the main factor that produces revenue is the amount of passengers that use the analysed infrastructure (whose variation per year has been assumed to be 3%). In addition to this, it has been assumed that air taxes remain constant throughout the analysed period of time (2010 - 2040).

- Supply:
  Taking into account that a 3% increase in the annual amount of passengers that use the airport has been assumed when realizing the CBA, the same 3% increase of the required supply has also to be considered when computing the financial analysis of the airport. Therefore, the item *Supply* has been computed assuming an annual 3% variation.

- Other exploitation revenue:
  In relation to the interview, the Lleida - Alguaire Airport does not make benefits through the car parking area, which is free for the airport's users. Therefore, the item "Other exploitation revenue" is due to the advertisements that are both realized and recorded within the infrastructure, which have been assumed to remain constant.

- Staff expenses:
  As aforementioned, the number of passengers that used the airport from 2010 to 2017 is real data, whereas from 2018 until 2040 has been predicted. Owing to this fact and in connection with the interview carried out to the Airport's director, staff expenses in the period 2010 - 2017 have been assumed to remain constant. In fact, when the charter flights UK - Lleida Alguaire Airport began, the amount of staff had to be increased but with no cost increase, thus the office staff had to be formed so as to be able to manage aircraft operations. Therefore, staff expenses have been assumed constant from 2010 to 2017 but, as the airport will have more passengers, it will have more benefits so as to employ more staff. Consequently, staff expenses have been assumed to remain constant until 2030, when due to the passengers increase, more staff is necessary and, owing to the fact that a 3% increase of passengers has been assumed, in 2031 staff expenses increase a 3% in relation to the previous year, and they remain constant until 2040.

- Other exploitation expenses:
  In connection with the item "Other exploitation expenses" and as the director of the airport stated in the interview, it considers the *maintenance and operating costs* of the airport. It has been assumed that there are no extraordinary maintenance costs, thus the item "Other exploitation expenses" is assumed to remain constant due to the fact that the maintenance of the airport has to be constant throughout its lifetime so as to ensure the appropriate and safe functioning of the whole infrastructure.

- Immobilized amortization:
  Because of economic theory, it is assumed to remain constant throughout the analysed period of time.

- Provision excess:
  According to the "Profit and Loss Account of 2014", this item is null in 2014. Therefore, it has been assumed that the Airport did not require external financing in 2014 and, due to the lack of data, it has been assumed to remain null throughout the analysed period of time.

- Other exploitation results:
  If the number of passengers varies, the benefits of the shops established within the airport will vary too (for instance, the bar or the magazine store). Owing to this fact, as it has been assumed that passengers increase 3% each year, the item "Other exploitation results" has been assumed to vary 3% in relation to the previous year too.

Therefore, in the Annex 3, the financial analysis carried out from 2010 until 2040 is shown. Subsequently and in relation to the results obtained, the Net Present Value (NPV) and the Internal Rate of Return (IRR) have been computed.

- Net Present Value (NPV)

In connection with the Net Present Value (NPV), it indicates in monetary units the social benefits of the project. It is computed through the following formula:

$$NPV = \sum_{t=1}^{n} \frac{B_t}{(1+r)^{t-1}} - \sum_{t=1}^{n} \frac{C_t}{(1+r)^{t-1}}$$

Where:

- B_t: project's benefits at period t
- C_t: project's costs at period t
- r: discount rate
- n: number of years of the analysis

The NPV has to be higher than zero and, in addition to this, the higher the NPV is, the more socially profitable the project will be. In fact:

- If NPV > 0: The investment will produce more benefits than the required profitability.
- If NPV < 0: The investment will produce losses in relation to the required profitability.
- If NPV = 0: The investment will produce neither benefits nor costs.

(*Guia per a l'avaluació de projectes de transport, 2010, Mcrit*)

In connection with the financial analysis carried out, the following NPV has been obtained:

Discount Rate = r = 3'5% *(SAIT)*

NPV = -133.350.270'89 € < 0

Therefore, the Lleida - Alguaire Airport has a negative NPV (NPV < 0), which means that the infrastructure is not profitable enough and, in fact, it will produce losses in relation to the required profitability.

- Internal Rate of Return (IRR)

In relation to the Internal Rate of Return (IRR), it is the discount rate "r" that makes the NPV zero, which is shown in the following formula:

$$IRR \rightarrow NPV = \sum_{t=1}^{n} \frac{B_t}{(1+r)^{t-1}} - \sum_{t=1}^{n} \frac{C_t}{(1+r)^{t-1}} = 0$$

The computed IRR has to be higher than the social discount rate and, in addition to this, the higher the IRR is, the more socially profitable the project will be. In fact:

- If IRR > r: The project will produce a higher profitability than the minimum required profitability.
- If IRR = r: The project will produce the minimum required profitability so as to balance the opportunity cost.
- If IRR < r: The project will produce a lower profitability than the minimum required.
- If IRR = 0%: The investment is balanced, but not the opportunity cost.

(*Guia per a l'avaluació de projectes de transport, 2010, Mcrit*)

In connection with the financial analysis carried out, the following IRR has been obtained:

IRR = -9% < 0

Therefore, the Lleida - Alguaire Airport has a negative IRR (IRR < 0), which means that the necessary investment that was needed so as to have the infrastructure built cannot be

justified. In fact, the project will produce a lower profitability than the minimum required and neither the investment nor the opportunity cost will be balanced.

10.4 Cost - Benefit Analysis

10.4.1 Introduction to the Cost - Benefit Analysis

As aforementioned, the cost benefit analysis of the Lleida - Alguaire Airport has been carried out so as to answer the following question: *Regarding the air transport market scenario that used to exist before 2010, was it really necessary to invest 90 million euros so as to design and build the current airport of Lleida - Alguaire?*
Therefore, so as to be able to answer the aforementioned question and to realize the cost benefit analysis, the following assumptions have been considered:

- Demand:
  An optimistic increase of 3% has been assumed owing to the fact that it is the average variation that can be observed within the period 2010 - 2017.
  The assumed prevision of demand depends on the fact that no other similar infrastructures will be built near the mountain area in order to compete with the Lleida-Alguaire Airport.

- Analysis Period:
  It is recommended to use a period of time of 30 years. In fact, it is common to think that such an infrastructure will be used much more time than just 30 years but, owing to the fact that it is difficult to estimate the variables' evolution, it is recommended not to use a period of time longer than 30 years. In addition to this, owing to the fact that a positive discount rate is applied, those values which are considerably far in time have a lower influence regarding the final results of the analysis.
  (*Guia per a l'avaluació de projectes de transport, 2010, Mcrit*)

  After 30 years (that is, in 2040), 66.900 passengers will use the infrastructure each year (annual optimistic increase of 3% from 2017 to 2040). On the one hand, it has to be considered that the average passengers variation from 2010 until 2017 is approximately 3% and, on the other hand, it has to be noted that, when applying the mentioned 3% increase per year, the maximum capacity of the airport is not exceeded, thus the infrastructure can deal with the maximum predicted demand of 66.900 passengers per year.

- Passenger's Origin and Destination:
  70% of the passengers that land in the Lleida-Alguaire Airport have the mountain area as their final destination and the same 70% of passengers will be tourists who travel because of recreation.
  (*Guia per a l'avaluació de projectes de transport, 2010, Mcrit*)

  Owing to the fact that most of the tourists who land in the Lleida - Alguaire Airport through charter flights are from the United Kingdom, it has been assumed that tourists come from one of the most important airports of the United Kingdom: the Airport of Gatwick. In addition to this, it has been assumed that once tourists have landed in the Lleida - Alguaire Airport, 70% of them are keen on travelling towards Andorra (Pyrenees) and that the charter company uses buses so as to transport these tourists. Nevertheless, the other 30% of tourists are assumed to remain within the area they have landed, thus they are not keen on travelling.

- Airports to compare:
  In order to answer the aforementioned question *Regarding the air transport market scenario that used to exist before 2010, was it really necessary to invest 90 million euros so as to design and build the current airport of Lleida - Alguaire?* , the Lleida - Alguaire Airport has been compared with the main airports that are close to it, which are the following: Girona Airport, Reus Airport, Barcelona Airport and Toulouse Airport. These airport are indicated in the following *Figure 16*:

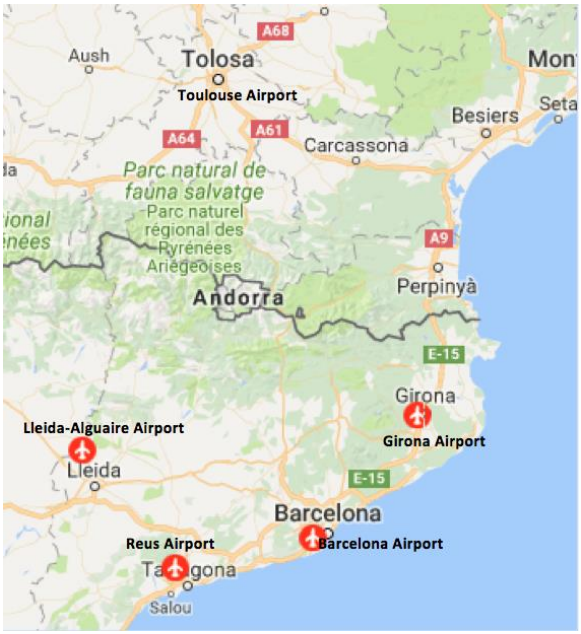

Figure 16: Map of the analysed airports *(Google Maps - Aeroports de Catalunya)*

Therefore, it has been assumed that all the analysed airports manage the same amount of passengers that the Lleida - Alguaire Airport has and, in addition to this, that one passengers land in each airport, 70% of them are transported towards Andorra by bus, whereas the other 30% of passengers do not travel, thus they remain within the area they have landed.

- Inflation:
  It has been assumed that inflation is null so as to compare the airports appropriately.

- Discount Rate
  In order to compute the NPV of each analysed case, the *SAIT* recommends a discount rate r=3’5%.

Therefore, if we assume that 70% of the passengers that land in each of the analysed airports are keen on going to Andorra (as the main Pyrenees’ users destination) whereas the other 30% remain within the area they have landed and that the analysed airports manage the same amount of passengers that the Lleida - Alguaire Airport manages from 2010 until 2040, the variation of the amount of costs produced if the Lleida-Alguaire Airport is used can be estimated.

To do so, the following distances, travel times and types of road have been considered (*Table 6*):

Trip	Distance	Travel Time	Type of road
Lleida Airport - Andorra	159 km	2h 12’ = 2’2 hours	C-26; C-14
Reus Airport - Andorra	190 km	2h 38’ = 2’63 hours	C-14
Gerona Airport-Andorra	199 km	2h 32’ = 2’53 hours	C-25
Barcelona Airport-Andorra	198 km	2h 29’ = 2’483 hours	C-16
Toulouse Airport - Andorra	193 km	2h 38’ = 2’63 hours	N-20

Table 6: Road Trip from (Lleida-Reus-Gerona-Barcelona-Toulouse) Airport to Andorra
(Google Maps)

10.4.2 Parameters Considered in the Cost - Benefit Analysis

In order to compare the Cost Benefit Analysis of the Lleida Alguaire Airport in relation to the airports of Reus, Girona, Barcelona and Toulouse, the following parameters have been considered:

- Road and Air Travel Time Cost:
  The travel time value is related to the cost of the time invested in the displacement of both people and freight considering all the displacement’s steps, such as access time, waiting time, time in the vehicles, transfers…
  In fact, any project that produces accessibility improvements or allows avoiding bottlenecks in the transport network will create socioeconomic benefits in terms of travel time saving. Moreover, these benefits depend on the amount of travel time saved and on the monetary value assigned to the time unit.
  In connection with transport projects, travel time saving is usually the main source of benefits. Moreover, the costs related to travel time value are internal due to the fact that they are experienced by users and, regarding travel time savings, they do not have a specific price market.
  The value that is broadly assigned to travel timesaving is its own opportunity cost or the user’s willingness to pay so as to achieve such a timesaving. Owing to this fact, travel time value depends on several circumstances, such as the individual income and the aim of the travel.
  On the one hand, when travels are carried out because of work, the travel time is included in the workday and it is assumed that its value is the marginal working cost. Hence, it is possible to use an average value of the business cost, which is adjusted to the analysed region.
  On the other hand, when travels are carried out because of other purposes such as work commuting, compulsory travels or travels because of recreation, their evaluation is not directly related to the salary, and thus it is carried out through estimates based on the revealed preference method.
  In relation to airports, it has to be considered that people who use these infrastructures because of business are usually people with high-income levels and thus they are above the average values of wages.
  The value of the travel time depends on the different opportunity cost of the displacement time for each passenger. Therefore, the value assigned to each type of

trip depends on the main aim of the trip. These values are shown in *Table 7* and *Table 8*:

Rail and road trips	
Reason of the trip	Value (€/hour·person)
Management and business	15'56
Work and study	10'74
Shopping	9'18
Recreation	7'31
Average value	11'02

Table 7: Rail and road trips time cost (*Guia per a l'avaluació de projectes de transport, 2010, Mcrit*)

Air travel	
Reason of the trip	Value (€/hour·person)
Management and business	38'08
Recreation	18'24

Table 8: Air travel time cost (*Guia per a l'avaluació de projectes de transport, 2010, Mcrit*)

The salary data is obtained from the survey published by IDESCAT and the other reasons for travelling are computed through the documents *Els comptes del transport de viatgers a la Regió Metropolitana de Barcelona*.
In connection with the air travel, the aforementioned values have been obtained from the European survey HEATCO.
(*Guia per a l'avaluació de projectes de transport, 2010, Mcrit*)

- Heavy Vehicles Functioning Cost:
  It is necessary to estimate the functioning costs of a vehicle depending on the kilometres realized. In relation to the recommended indicator value of 2010, the following mechanic operating costs are considered, which are measured in (€/vehicle·km), *Table 9*:

Parameter	**Cars**	**Heavy vehicles**
Conservation	0'06	0'76
Lubricants	0'00	0'01
Tires	0'01	0'08
TOTAL	0'07	0'85

Table 9: Heavy vehicles functioning cost (*Guia per a l'avaluació de projectes de transport, 2010, Mcrit*)

- Bus Pollution Cost:
  In order to be able to compute the costs produced by the vehicles' emissions, it is necessary to know the composition of the vehicles park as well as the average velocities. Therefore, in relation to the recommended indicator value of 2010, the costs are the following:
  - Light vehicles: 14'0 €/1.000km
  - Heavy vehicles: 43'8 €/1.000km

  These values have been obtained from the document *UNITE Unification of accounts and marginal costs for Transport Efficiency*, ITS, University of Leeds, 2003 (updated to euros).
  (Guia per a l'avaluació de projectes de transport, 2010, Mcrit)

- Bus and Aircraft Noise Cost:
  The cost of the noise produced because of the functioning of the infrastructure ought to be estimated through the cost of the preventing measures that are necessary so as to avoid high levels of noise. In fact, the methods based on the citizens' willing of paying for having the levels of noise reduced are not always consistent.
  Hence, the following values (*Table 10*) have been obtained by using the recommended indicator value of 2010 and from the ATM's survey.

Transport Mode	**Average value (€/1.000 vehicles-km)**
Private vehicle	4'54 €
Bus	10'20 €
Rail transport (passengers)	124'39 €
Air transport (passengers)	154'28 €
Trucks (freight)	16'32 €
Vans (freight)	7'31 €
Rail transport (freight)	127'50 €
Air transport (freight)	154'28 €

Table 10: Bus and aircraft noise cost *(Guia per a l'avaluació de projectes de transport, 2010, Mcrit*)

- Bus Driver Cost:
  In connection with the document *Observatorio de costes del transporte de viajeros en autocar* that can be found in the Spanish Government web, the following data is assumed for a 55 passengers capacity bus:

Annual driven hours	1.800 hours
Driver annual cost (Social Safety included)	30.441'81 €
Driver hour cost	16'91 €/hour·vehicle

Table 11: Bus driver cost (*Observatorio de costes del transporte de viajeros en autocar)*

Therefore, the bus driver cost applied is 16'91 €/(hour·vehicle).

- Bus Fuel Cost:
  Regarding the document *Observatorio de costes del transporte de viajeros en autocar* that can be found in the Spanish Government web, the following data is assumed for a 55 passengers capacity bus:

Bus average fuel consume	30'0 L/100km = 0'3 L/km
Fuel price (with VAT)	1'1029 €/L

Table 12: Bus fuel cost (*Observatorio de costes del transporte de viajeros en autocar)*

Therefore, in relation to this data, the bus fuel cost can be computed assuming 1'1029€/L and an average consume of 0'3L/km.

- Number of Bus Accidents and Bus Accidents Cost:

  On the one hand, the number of bus accidents depends on the type of road that the bus will be driving through. Therefore, *Table 13* shows the number of accidents and, in addition to this, the number of deaths, serious injuries and minor injuries that might happen depending on each type of road.

Type of road	Accidents/(million of veh/km)	Deaths per accident	Serious injuries per accident	Minor injuries per accident
Motorway	0'04	0'12	0'65	1'13
Double carriageway road	0'06	0'13	0'66	1'11
Single carriageway road	0'19	0'10	0'60	0'95
Preferential route with a single carriageway	0'08	0'14	0'67	1'09

Table 13: Number of accidents depending on the type of road
(Guia per a l'avaluació de projectes de transport, 2010, Mcrit)

On the other hand, *Table 14* shows the bus accident cost depending on each type of accident:

Parameter of the accident	Cost
Affected vehicles	1.809 €/vehicle
Minor injuries	16.720 €/(injured person)
Serious injuries	217.154 €/(injured person)
Deaths	1.661.294 €/(injured person)

Table 14: Bus accident cost depending on each type of accident
(Guia per a l'avaluació de projectes de transport, 2010, Mcrit)

Eventually, the following types of road have been considered:

- Lleida - Alguaire Airport to Andorra: C-26; C-14; single carriageway road.
- Gerona Airport to Andorra: C-25; double carriageway road.
- Reus Airport to Andorra: C-14; single carriageway road.
- Barcelona Airport to Andorra: C-16; double carriageway road.
- Toulouse Airport to Andorra: N-20; double carriageway road.

- Pilot Cost:

  In relation to the pilot cost, it is difficult to determine owing to the fact that not all the pilots earn the same amount of money each month. Moreover, the first pilot earns more money than the second pilot.

  Therefore, providing that the charter company that flies from Gatwick to the Lleida - Alguaire Airport so as to bring tourists to the Pyrenees is Thomas Cook Airlines and regarding the data provided by *DeFinanzas*, it has been assumed that the first pilot earns 62.000 € per year (that is, 5.166'67€ per month) and that the second pilot earns 21.000 each year (that is, 1.750€ per month). In addition to this, it has been assumed that both the first and the second pilot work approximately 21 days per month and that they fly approximately 6 hours per day (that is, without considering the amount of time they remain stopped at each airport).

  Therefore, the following costs are obtained:

- First Pilot: 41’01 €/(hour flown)
- Second Pilot: 13’89 €/(hour flown)

- Aircraft Fuel Cost:
  In order to compute the cost of the amount of fuel used, it has to be considered that an airbus A-321 is used. Therefore, regarding the main characteristics of this aircraft and according to *Sherpa Report*, the average fuel consume is obtained as follows:

Maximum fuel capacity	30.030 L
Maximum reach	5.600 km
Average speed	800 km/h
Average fuel consume	5 L/km

Table 15: Aircraft fuel cost *(Sherpa Report)*

  Hence, it has been assumed that an airbus A-321 uses 5 litres of kerosene per kilometre and that, in addition to this, the kerosene price is 1’45 €/gallon (that is, 0’38 €/L).

- Aircraft Pollution Cost:
  Regarding aircraft pollution, aircrafts produce several gases that cause both pollution and contribute to climate change. Therefore, in order to analyse the effect of aircraft pollution, the amount of CO2 produced by airplanes has been computed.
  The amount of CO2 emitted by civil aircrafts varies widely depending on several parameters such as the aircraft’s size, the amount of passengers, the flying height and the flown distance. Hence, in order to be able to compute the amount of CO2 emitted by aircrafts per kilometre and passengers, the analysis carried out by LIPASTO (Finland, 2008) has been considered:

Type of Flight	**CO2 Emission**
Civil, Domestic, Short distance (< 463 km)	259 g/(km·passenger)
Civil, Domestic, Long distance (> 463 km)	178 g/(km·passenger)
Civil, International	114 g/(km·passenger)

Table 16: Aircraft pollution emission *(LIPASTO, Finland, 2008)*

  Hence, owing to the fact that the analysed flights are international, the CO2 emission of 114 g/(km·passenger) has been considered.
  In addition to this, the following values of CO2 have been considered:

Parameter	**Value (€/ton)**
CO2 - From 2010 to 2020	28’00
CO2 - From 2020 to 2030	33’00
CO2 - From 2030 to 2040	41’00

Table 17: CO2 value *(Guia per a l’avaluació de projectes de transport, 2010, Mcrit*)

- Aircraft Noise Cost:
  In order to compute the aircraft noise cost, air passengers’ transport has to be considered. Hence, as aforementioned in *Table 10*, the recommended average value is the following:

$$154'28 \frac{€}{1.000\ vehicles \cdot km}$$

- Aircraft Functioning Cost:

  So as to compute the aircraft functioning cost, the calculation programme known as *Freight Metrics* has been used. Hence, in order to obtain the aircraft operating cost per person depending on the flown distance, the following data has been considered:

  - Type of aircraft: A321
  - Capacity per flight: 180 passengers
  - Flights per day: 3
  - Days per week that aircrafts work: 7
  - Weeks per year that aircrafts are operating: 52 (all the year)
  - Daily number of passengers: 540
  - Average speed: 431'97 knot = 800 km/h

  Note that some of the aforementioned data has been obtained regarding that the company that brings Pyrenees's tourist from Gatwick to Andorra is Thomas Cook Airlines, which in 2016 managed 6.623.564 passengers through 32.208 flights, that is:

$$\frac{88\ flights}{day} = \frac{3\ flights}{day \cdot aircraft}.$$

  Therefore, the following aircraft functioning costs per person have been obtained:

Trip	**Aircraft Functioning Cost ($/person)**	**Aircraft Functioning Cost (€/person)**
Gatwick - Lleida (1400km)	9'11	8'14
Gatwick - Gerona (1300km)	8'53	7'62
Gatwick - Reus (1600km)	10'27	9'17
Gatwick - Barcelona (1500km)	9'69	8'65
Gatwick - Toulouse (1100km)	7'37	6'58

Table 18: Aircraft functioning costs per person *(Freight Metrics - Thomas Cook Airline)*

- Use of Land Cost:

  The use of land cost is related to the costs produced by the fact that the land occupied by the airport cannot produce wealth nor crops as it used to do before the infrastructure was built.

  Due to the fact that this project is analysing whether the investment that was required so as to build the Lleida - Alguaire Airport is reasonable from a social point of view in respect to the other surrounding main airports, the use of land cost has been only considered in the Lleida - Alguaire Airport and, in addition to this, it has been supposed that this cost remains constant throughout the analysed period of time (2010 - 2040).

  Regarding the calculation of this cost, as aforementioned, the Lleida - Alguaire Airport occupies 367 ha near Alguaire, which used to be used as crops. Furthermore, the cost of using land so as to build an infrastructure is computed through the annual monetized global impact to ecosystems and it is measured in € per hectare and it depends on the specific type of soil. It measures the value of those functions that become lost each year. In order to compute the following values, the recommended indicator value of 2010 and the document *Valuation of ecosystem services in the Catalan coastal zone* have been used. These costs are shown in *Table 19*:

Type of Soil	Value (€/ha·year)
Forests	3.383
Meadows	205
Crops	1.981
Wet areas	26.153
Continental water	1.750
Environmental bufer	7.738
Green urban areas	4.888
Urban / Peri-urban / Burned	0
Average Value (Catalan soil distribution)	2.983

Table 19: Value of soil *(Guia per a l'avaluació de projectes de transport, 2010, Mcrit*)

Therefore, as the Lleida - Alguaire Airport land used to be used as crops, the following value has been assumed:

$$1.981\ \frac{€}{ha}$$

Cosequently, the annual use of land cost has been computed as follows:

$$1.981 \frac{€}{ha} \cdot 367\ ha = 727.027\ €$$

10.4.3 Computations Realized in the Cost - Benefit Analysis

Regarding the CBA carried out, the following computations have been required in connection with the aforementioned parameters. It has to be noted that an example of the Lleida - Alguaire Airport is provided forwards (year 2010 of the analysis), taking into account that the same calculation method has been applied in relation to the other analysed years and airports. In fact, all the computations and Cost Benefit Analyses are provided in the Annex 3 and 4.

- Other Cash Flows:

In relation to the item "Other Cash Flows", it is necessary to consider an investment of (-90.000.000 €) at the first year, a residual value of (+36.000.000 €) at the last year and a constant maintenance cost of (-78.700 €) each year.

- Road Travel Time Cost:

Regarding that it has been assumed that 70% of the passengers that land in the mentioned airports have Andorra (Pyrenees) as their final destination, recreation has been considered as the reason of their trip. Therefore, a cost of 7'31 €/(hour·person) has been applied.
It has also to be noted that there are 159 km between Lleida and Andorra (2'2 hours) and that a bus capacity of 55 passengers is considered. Furthermore, in connection with the parameter "time", it has to be considered the double of one trip time due to the fact that passengers have to go from the airport to Andorra and, at the end of their holidays, they have to go back to the initial airport so as to fly home.
For instance, the road travel time cost for the Lleida - Alguaire Airport and at the year 2010 has been carried out as follows:

$$7'31 \frac{€}{hour \cdot person} \cdot (2 \cdot 2'2\ hour) \cdot \left(\frac{70}{100} \cdot 61769\ person\right) = 1.390.716'68€$$

- Air Travel Time Cost:

So as to compute the air travel time, it has been assumed that an Airbus A-321 is used, that its average speed is 800 km/h and its capacity is 180 passengers. The air distance between the airport of Lleida - Alguaire and the airport of Gatwick is 1400 km, thus the air travel time is 1'75 hours. Moreover, as most of the passengers are tourists, recreation trips have been assumed, whose air travel time cost is 18'24 €/(hour·person). Therefore, the following calculation has been carried out:

$$18'24\frac{€}{hour \cdot person} \cdot (2 \cdot 1'75hour) \cdot \left(\frac{70}{100} \cdot 61769person\right) = 2.760.333'07€$$

- Heavy Vehicles Functioning Cost:

In addition to the aforementioned data and in order to compute this cost, it has been considered that a functioning cost of 0'85€/(vehicle·km) has been assumed due to the fact that buses are used. These buses have a capacity of 55 passengers and the trip distance is 159 km from the airport of Lleida to Andorra. The following calculation has been realized:

$$0'85\frac{€}{vehicle \cdot km} \cdot (2 \cdot 159km) \cdot \frac{1\ vehicle}{55\ person} \cdot \left(\frac{70}{100} \cdot 61769person\right) = 212496'59€$$

- Bus Pollution Cost:

So as to compute the bus pollution cost, it is necessary to consider the aforementioned heavy vehicles pollution cost of 43'8€/(1.000km) and, in addition to this, that the bus capacity is 55 passengers and that the bus has to travel 159 km so as to go from the airport of Lleida - Alguaire to Andorra. Therefore, the following calculation has been realized:

$$\frac{43'8€}{1000km} \cdot (2 \cdot 159km) \cdot \frac{1\ vehicle}{55\ person} \cdot \left(\frac{70}{100} \cdot 61769person\right) = 10.949'82€$$

- Bus Noise Cost:

In order to compute the bus noise cost, as aforementioned, the cost is 10'20€/(1.000vehicles·km). Moreover, it has to be considered that the airport of Lleida and Andorra are separated by 159 km and that the capacity of the used buses is 55 passengers per bus. Hence, the bus noise cost is computed as follows:

$$\frac{10'2€}{1000vechiles \cdot km} \cdot (2 \cdot 159km) \cdot \frac{1\ vehicle}{55\ person} \cdot \left(\frac{70}{100} \cdot 61769person\right) = 2.549'96€$$

- Passenger's Aircraft Noise Cost:

In order to compute the passenger's aircraft noise cost, as aforementioned, the cost is 154'28€/(1.000vehicles·km). Moreover, it has to be considered that the airports of Lleida and Gatwick are separated by 1400 km and that the capacity of the used aircrafts (A-321) is 180 passengers per aircraft. Hence, the passenger's aircraft noise cost is computed as follows:

$$\frac{154'28€}{1000vechiles \cdot km} \cdot (2 \cdot 1400km) \cdot \frac{1\ vehicle}{180\ person} \cdot (61769person) = 103.768'08€$$

- Bus Driver Cost:

Regarding the bus driver cost, the aforementioned cost of 16'91€/(hour·vehicle) is assumed in relation to the used buses of 55 passengers capacity. Moreover, the road travel time from the airport of Lleida - Alguaire to Andorra is 2'2 hours. Hence, the following computation has been realized:

$$\frac{16'91€}{hour \cdot vehicle} \cdot (2 \cdot 2'2hour) \cdot \frac{1\ vehicle}{55\ person} \cdot \left(\frac{70}{100} \cdot 61769person\right) = 58.492'77€$$

- Bus Fuel Cost:

In relation to the bus fuel cost, it has been assumed that the average bus consume (55 passenger capacity) is 0'3L/km and its cost 1'1029€/L. Moreover, the distance of the road trip is 159 km. The following calculation has been done:

$$1'1029\frac{€}{L}\cdot\frac{30L}{100km}\cdot(2\cdot 159km)\cdot\frac{1\ vehicle}{55\ person}\cdot\left(\frac{70}{100}\cdot 61769person\right)=82.716'17€$$

- Number of Bus Accidents and Bus Accidents Cost:

Therefore, regarding the parameters indicated before, the 159 km between the airport of Lleida - Alguaire and Andorra and that buses of 55 passengers capacity are used, the following calculation has been realized:

$$0'19\frac{accidents}{10^6\cdot\frac{vehicle}{km}\cdot(2\cdot 159km)}\cdot\frac{1\ vehicle}{55\ person}\cdot\left(\frac{70}{100}\cdot 61769person\right)=4'6971\cdot 10^{-7}Acciednts$$

$$4'6971\cdot 10^{-7}Acciednts\cdot(\frac{1809€}{accident}+\frac{0'95\cdot 55minorinjuries}{1accident}\cdot\frac{16720€}{minorinjury}+\frac{0'60\cdot 55seriousinjuries}{1accident}\cdot\frac{217154€}{seriousjury}+$$

$$+\frac{0'10\cdot 55deaths}{1accident}\cdot\frac{1661294€}{death})=8'07€$$

-Pilot Cost:

Therefore, in order to compute the pilot cost, it has been assumed that the cost of the first pilot is 41'01€/(hourflown) whereas the cost of the second pilot is 13'89€/(hourflown). Consequently, the total pilot cost is 54'9€/(hourflown). Taking into account that the flight duration from Gatwick Airport to Lleida - Alguaire Airport is 1'75 hours and that Airbus A-321 with 180 passengers capacity is used, the following calculation has been realized:

$$54'9\frac{€}{hour\ flown}\cdot 2\cdot 1'75hour\cdot\frac{1\ vehicle}{180passengers}\cdot 61769passenger=65.938'41€$$

-Aircraft Fuel Cost:

In order to compute the aircraft fuel cost, it has to be considered that the average aircraft A-321 fuel consume is 5L/km and that the average fuel (kerosene) price is 0'38€/L. Moreover, regarding that the airports of Gatwick and Lleida - Alguaire are separated by 1.400 km and that the capacity of an Airbus A-321 is 180 passengers, the following computations has been done:

$$\frac{0'38€}{L}\cdot\frac{5L}{1\ km}2\cdot 1.400km\cdot\frac{1\ vehicle}{180passengers}\cdot 61769passenger=1.825.617'11€$$

-Aircraft Pollution Cost:

So as to compute the aircraft pollution cost, it has been assumed that a CO2 emission produced by civil international aircrafts of 114g/(km·passenger) and, in addition to this, the aforementioned values of CO2. Therefore, the following computation has been realized (note that, as aforementioned, the value of CO2 changes depending on the analysed year):

$$\frac{28€}{1tonCO2}\cdot\frac{1tonCO2}{1000\ kgCO2}\cdot\frac{1kgCO2}{10^3gCO2}\cdot\frac{114gco2}{km\cdot passenger}2\cdot 1.400km\cdot 61769passenger=552.066'61€$$

-Aircraft Noise Cost:

Regarding that passengers aircraft noise cost is 154'28€/(1000vehicles·km), that Airbus A-321 with capacity of 180 passengers and that the flight distance from the airports of Gatwick and Lleida - Alguaire is 1.400km, the following calculation has been realized:

$$154'28\frac{€}{1000vehicles \cdot km} \cdot (2 \cdot 1400km) \cdot \frac{1\ vehicle}{180passengers} \cdot 61769passenger = 148.240'11€$$

-Aircraft Functioning Cost:

So as to compute the aircraft functioning cost and in relation to the flight Gatwick - Lleida Airports, the aircraft functioning cost that has been considered is 8'14€/passenger. Therefore, the following calculation has been realized:

$$8'14\frac{€}{passenger} \cdot 61769passenger \cdot 2 = 1.005.599'32€$$

Eventually, it has to be noted that, regarding air travel, passengers have to go from Gatwick Airport to the analysed airport and, at the end of their trip, they have to do the same journey again so as to get home. This situation also happens regarding the road transport from each analysed airport towards Andorra, as passengers have to return to the analysed airport so as to be able to fly back home. Owing to this fact and in connection with the aforementioned calculations, some of the parameters are multiplied by 2 (the trip distance or the trip time).

10.4.4 Results of the Cost - Benefit Analysis

The aforementioned costs have been used so as achieve the "total transport cost" for each of the analysed airports (Lleida - Alguaire, Girona, Reus, Barcelona and Toulouse Airports) and during the analysed period of time (2010 - 2040).

So as to compute the value of the CBA regarding each of the costs produced in the Lleida - Alguaire Airport compared to each of the other analysed airports, the following computations has been realized:

$$(COST_{\text{Lleida-Alguaire Airport}} - COST_{AIRPORTn}),$$

Where n = (Airports of Girona, Rues, Barcelona, Toulouse)

Therefore, regarding each of the analysed parameters, two possible scenarios can happen:

- If $(COST_{\text{Lleida-Alguaire Airport}} - COST_{AIRPORTn}) > 0$, then $COST_{\text{Lleida-Alguaire Airport}} > COST_{AIRPORTn}$, thus the Lleida - Alguaire Airport was not profitable being constructed.
- If $(COST_{\text{Lleida-Alguaire Airport}} - COST_{AIRPORTn}) < 0$, then $COST_{\text{Lleida-Alguaire Airport}} < COST_{AIRPORTn}$, thus the Lleida - Alguaire Airport was profitable being constructed.

In fact, so as to be able to answer the aforementioned question *Regarding the air transport market scenario that used to exist before 2010, was it really necessary to invest 90 million euros so as to design and build the current airport of Lleida - Alguaire?* the social Net Present Value and the social Internal Rate of Return have been computed for each of the analysed scenarios.

In fact, the entire CBA results are shown in Annex 4 and, in addition to this, the social NPV and IRR are shown forwards:

- CBA LLEIDA - GIRONA:
  - SOCIAL NPV = -91737394'38€ < 0
  - r = 3'5%
  - SOCIAL IRR= -5% < 0

- CBA LLEIDA - REUS:
  - SOCIAL NPV = -73025478'70€ < 0
  - r = 3'5%
  - SOCIAL IRR= -3% < 0

- CBA LLEIDA - BARCELONA:
  - SOCIAL NPV = -80119034'78€ < 0
  - r = 3'5%
  - SOCIAL IRR= -3% < 0

- CBA LLEIDA - TOULOUSE:
  - SOCIAL NPV = -103093469'05€ < 0
  - r = 3'5%
  - SOCIAL IRR= -6% < 0

Therefore, according to the analysis that has been realized in this thesis, the four assumed scenarios produce similar results, which are a negative Net Present Value (NPV < 0) and a negative Internal Rate of Return (IRR < 0).

- In relation to NPV < 0, the investment will produce losses in relation to the required profitability.
- In relation to IRR < 0: Neither the investment nor the opportunity cost are balanced. The project will produce a lower profitability than the minimum required.

In fact, the worst scenario has been the CBA Lleida - Toulouse due to the fact that Toulouse is more close to Gatwick Airport in relation to air transport costs and it is also more close to Andorra in connection with road transport costs.

10.4.5 Sensitivity Analysis

The results obtained in the Cost Benefit Analysis ought to undergo a sensitivity analysis of the main variables, which consists on modifying some of the parameters that have been considered and analyse whether it affects the social profitability of the project. Therefore, the main aim of the sensitivity analysis is to know how the quantifying of some of the used variables affects the final result and, in addition to this, it allows to check whether the obtained result is robust or not.

In fact, three sensitivity analysis haven been carried of in relation to the main CBA realized:

- Sensitivity Analysis 1: It has been assumed that, once passengers land in each of the analysed airports, 70% of them go to Andorra (Pyrenees), whereas the other 30% travel to the Aigüestortes National Park.
- Sensitivity Analysis 2: It has been assumed that, once passengers land in each of the analysed airports, 70% of them are keen on going to Boí Taüll Resort, whereas the other 30% travels to the Aigüestortes National Park.
- Sensitivity Analysis 3: Regarding this sensitivity analysis, its aim is to compute how many passengers the Lleida - Alguaire Airport ought to have so as to become profitable if compared with the other analysed airports.

It has to be noted that the costs of each sensitivity analysis, which are shown in Annex 5, have been computed in relation to the same method that has been used in the main CBA.
Furthermore, the following image (*Figure 17*) shows where the Aigüestortes National Park, Andorra and Boí Taüll Resort are located in relation to the analysed airports:

Figure 17: Location map of Aigüestortes National Park, Boí Taüll Resort, Andorra and analysed airports *(Google Maps)*

10.4.5.1 Sensitivity Analysis 1

Regarding the CBA carried out before, as aforementioned, it has been assumed that 70% of the passengers that land at each of the analysed airports go to Andorra, whereas the other 30% do not travel, thus they remain within the area they have landed.
Nonetheless, in connection with the sensitivity analysis 1, it will be assumed that, on the one hand, 70% of the passengers go to Andorra, whereas the other 30% are keen on visiting the Aigüestortes National Park.
It has to be noted that, in the previous CBA, the social cost of *air transport* has been computed considering all the passengers (100% of the passengers). Therefore, in order to realize the explained sensitivity analysis, it is only necessary to compute the costs of transporting the other 30% of passengers through *bus transport* towards the Aigüestortes National Park (entire calculations are shown in Annex 5 of sensitivity analysis) and, regarding the global CBA of the 100% of passengers, it can be easily obtained by adding the new results of the Aigüestortes National Park to the previous CBA of each airport.

As aforementioned in the main CBA, so as to compute the different costs appropriately, it is necessary to know the distance, the road travel time and the type of road between each of the analysed airports and the final destination, which is shown in the following *Table 20*:

Trip	Road Distance	Road Travel Time	Type of Road
Lleida Airport - Aigüestortes N.P.	128 km	1h 40 min = 1'67 hours	N-230 ; 1 carriageway road
Gerona Airport - Aigüestortes N.P.	269 km	3h 43 min = 3'72 hours	N-260 ; 1 carriageway road
Reus Airport - Aigüestortes N.P.	228 km	2h 59 min = 2'98 hours	N-230 ; 1 carriageway road
BCN Airport - Aigüestortes N.P.	259 km	3h 27 min = 3'45 hours	A-2 ; 1 carriageway road
Toulouse Airport - Aigüestortes N.P.	221 km	2h 58 min = 2'97 hours	N-230 ; 1 carriageway road

Table 20: Road distance and travel time and type of road - Sensitivity Analysis 1 *(Google Maps)*

Therefore, in relation to the computations that can be shown in Annex 5 of sensitivity analysis, the following results have been obtained for each of the analysed scenarios:

- CBA LLEIDA - GIRONA (Sensitivity Analysis 1):
  - SOCIAL NPV = -82649473'96€ < 0
  - r = 3'5%
  - SOCIAL IRR= -4% < 0

- CBA LLEIDA - REUS (Sensitivity Analysis 1):
  - SOCIAL NPV = -67110553'74€ < 0
  - r = 3'5%
  - SOCIAL IRR= -2% < 0

- CBA LLEIDA - BARCELONA (Sensitivity Analysis 1):
  - SOCIAL NPV = -72134937'33€ < 0
  - r = 3'5%
  - SOCIAL IRR= -3% < 0

- CBA LLEIDA - TOULOUSE (Sensitivity Analysis 1):
  - SOCIAL NPV = -97291440'22€ < 0
  - r = 3'5%
  - SOCIAL IRR= -6% < 0

Regarding the results obtained in this thesis, and like the results obtained in the main CBA, the four scenarios produce both negative NPVs and negative IRRs, despite the fact that some of the results could be considered better than the scenario assumed in the main CBA. This improvement could be owing to the fact that, in relation to road transport costs, the Lleida - Alguaire Airport is quite close to the Aigüestortes National Park. In fact:

- CBA LLEIDA - GIRONA (Aigüestortes N.P. and Andorra)
  Regarding road transport costs and the 30% of passengers that travel to the National Park, the airport of Lleida is socially better than the airport of Girona. Moreover, despite the fact that this sensitivity analysis is negative for the airport of Lleida, the social costs in relation to the aforementioned scenario (only 70% of passengers travelled) have improved: if only 70% of passengers travel, Lleida has a social surcharge of 26421572'07€ in (2010-2040), whereas if all the passengers travel (sensitivity analysis 1) the social surcharge decreases 60'5% towards 10449470'57€.

- CBA LLEIDA - REUS (Aigüestortes N.P. and Andorra)
  Regarding road transport costs and the 30% of passengers that travel to the National Park, the airport of Lleida is socially better than the airport of Reus. Moreover, despite the fact that this sensitivity analysis is negative for the airport of Lleida, the social costs in relation to the aforementioned scenario (only 70% of passengers travelled) have improved. In fact, as observed before, if only 70% of passengers travel, Lleida is socially better than Reus except in the period (2011 - 2018), when the main CBA is negative for the Lleida - Alguaire Airport.

- CBA LLEIDA - BARCELONA (Aigüestortes N.P. and Andorra)
  Regarding road transport costs and the 30% of passengers that travel to the National Park, the airport of Lleida is socially better than the airport of Barcelona.
  Moreover, despite the fact that this sensitivity analysis is negative for the airport of Lleida, the social costs in relation to the aforementioned scenario (only 70% of passengers travelled) have improved. In fact, if the 100% of passengers travel (sensitivity analysis 1), the CBA is positive for the airport of Lleida in most of the years due to the fact that $COST_{lleida} < COST_{BCN}$, except in the years 2011 to 2016, when the social cost of Lleida is higher than the cost of Barcelona.

Sensitivity analysis 1 is better than the main CBA, which assumes that only 70% of the passengers travel and because of which the airport of Lleida is socially worse than the airport of Barcelona in most of the years.

- CBA LLEIDA - TOULOUSE (Aigüestortes N.P. and Andorra)
  Regarding road transport costs and the 30% of passengers that travel to the National Park, the airport of Lleida is socially better than the airport of Toulouse due to the fact that $COST_{lleida} < COST_{toulouse}$ from 2010 until 2040.
  Regarding sensitivity analysis 1, the airport of Lleida is socially worse than the airport of Toulouse due to the fact that $COST_{lleida} > COST_{toulouse}$ from 2010 to 2040. Nevertheless, the results obtained in sensitivity analysis 1 (social surcharge of 36287689'00 €) are better than the values obtained if only 70% of passengers travel (social surcharge of 46484807'96 €). Hence, the social surcharge decreases 22% in the analysed period (2010-2040).

10.4.5.2 Sensitivity Analysis 2

As aforementioned, in connection with the main CBA carried out before, it was assumed that 70% of the passengers that land at each of the analysed airports go to Andorra, whereas the other 30% do not travel, thus they remain within the area they have landed.
Nevertheless, in relation to the sensitivity analysis 2, the following scenario will be assumed:

- On the one hand, instead of Andorra, it has been assumed that 70% of the tourists that land in each of the analysed airports are keen on skiing in Boí Taüll Resort.
- On the other hand, it has also been assumed that, in addition to the 70% of tourists that travel towards Boí, the other 30% of tourists are keen on visiting the Aigüestortes National Park. Hence, all the tourists that land in each of the analysed airports travel.

Furthermore, it has to be noted that to analyse the CBA of the sensitivity analysis 2, there are three main parameters to be considered: the air transport cost from Gatwick Airport to each of the analysed airports, the bus transport cost towards Boí and the bus transport cost towards the Aigüestortes National Park. However, it is only necessary to compute the bus transport cost towards Boí due to the fact that the other two costs have already been computed before and they remain constant.
As aforementioned in the main CBA, so as to compute the different costs appropriately, it is necessary to know the distance, the road travel time and the type of road between each of the analysed airports and the final destination, which is shown in the following *Table 21*:

Trip	Road Distance	Road Travel Time	Type of Road
Lleida Airport - Boí	132 km	1h 57min = 1'95 hours	N-230 ; 1 carriageway road
Gerona Airport - Boí	305 km	4h 7min = 4'12 hours	C-25 ; Double carriageway road
Reus Airport - Boí	232 km	3h 13min = 3'22 hours	N-230 ; 1 carriageway road
BCN Airport - Boí	306 km	3h 49min = 3'82 hours	N-230 ; Double carriageway road
Toulouse Airport - Boí	225 km	3h 3min = 3'05 hours	N-230, A64 ; Double carriageway road

Table 21: Road distance and travel time and type of road - Sensitivity Analysis 2
(Google Maps)

Therefore, in relation to the computations that can be shown in Annex 5 of sensitivity analysis, the following results have been obtained for each of the analysed scenarios:

- CBA LLEIDA - GIRONA:
  - SOCIAL NPV = -49831369'61€ < 0
  - r = 3'5%
  - SOCIAL IRR= -1% < 0

- CBA LLEIDA - REUS:
  - SOCIAL NPV = -44515286'52€ < 0
  - r = 3'5%
  - SOCIAL IRR= 0% = 0

- CBA LLEIDA - BARCELONA:
  - SOCIAL NPV = -41442051'08€ < 0
  - r = 3'5%
  - SOCIAL IRR= 0% = 0

- CBA LLEIDA - TOULOUSE:
  - SOCIAL NPV = -76411738'50€ < 0
  - r = 3'5%
  - SOCIAL IRR= -3% < 0

Therefore, according to the sensitivity analysis 2 that has been carried out, this scenario according to which 70% of the passengers travel to Boí Taüll Resort whereas the other 30% are keen on visiting the Aigüestortes National Park produces better social and economic results regarding the Lleida - Alguaire Airport than the scenarios assumed in the main CBA and in the sensitivity analysis 1. Despite the fact that the CBA Lleida - Girona and the CBA Lleida - Toulouse produce both negative NPV and negative IRR, the other two scenarios (CBA Lleida - Reus and CBA Lleida - Barcelona) produce a negative NPV but an IRR = 0%. Therefore, regarding the CBA Lleida - Reus and the CBA Lleida - Barcelona, the investment that was required so as to build the Lleida - Alguaire Airport is balanced, but not the opportunity cost.

10.4.5.3 Summary of the Sensitivity Analyses 1 and 2 and main CBA

In connection with the sensitivity analyses 1 and 2 and regarding the main CBA realized in this thesis, a summary of the obtained results is provided forwards:

- CBA: LLEIDA - GIRONA

  In relation to the CBA Lleida - Gerona carried out in the sensitivity analysis 2, it is demonstrated that the social costs of the Lleida - Alguaire Airport are lower than the social costs of Gerona Airport due to the fact that $COST_{lleida} - COST_{gerona} < 0$. Therefore, providing that English tourists are keen on going towards the Aigüestortes National Park and to Boí, from a social point of view, it is better to operate through the Lleida - Alguaire Airport than from Gerona Airport.

  It has to be noted that the scenario considered in the sensitivity analysis 2, according to which 70% of the English tourists go to Boí and the other 30% go to the Aigüestortes National Park, is the only scenario that makes the Lleida - Alguaire Airport socially better than the Gerona Airport owing to the fact that, in connection with the main scenario according to which 70% of the tourists go to Andorra while the other 30% do not travel and in relation to the scenario that assumes that 70% of the tourists go to Andorra and the other 30% go to the Aigüestortes National Park, the social cost of the Lleida - Alguaire Airport is higher than the social cost of Gerona Airport, thus the airport of Lleida is not socially competitive.

Scenario: CBA Lleida - Gerona Airports	**Social Cost**	**Lleida-A. Airport is…**
70% Andorra; 30% don't travel	$COST_{lleida} > COST_{gerona}$	Not socially competitive
70% Andorra; 30% Aigüestortes N.P.	$COST_{lleida} > COST_{gerona}$	Not socially competitive

70% Boí ; 30% Aigüestortes N.P.	$COST_{lleida} < COST_{gerona}$	Socially competitive

Table 22: CBA Lleida - Girona Summary *(Own elaboration)*

- CBA: LLEIDA - REUS:

  In connection with the CBA Lleida - Reus realized in the sensitivity analysis 2, it can be stated that the social costs of the Lleida - Alguaire Airport are lower than the social costs of the Reus Airport owing to the fact that COSTlleida - COSTreus < 0. Hence, in order to bring English tourists to the Aigüestortes National Park and to Boí, from a social point of view, it is better to use the Lleida - Alguaire Airport than the airport of Reus.

  It ought to be considered that, despite the scenario considered in the main CBA according to which 70% of the English tourists go to Andorra and the other 30% do not travel, both the CBAs of sensitivity analysis 1 and 2 state that the social costs of the Lleida - Alguaire Airport are lower than the social costs produced when operating from the airport of Reus. In fact, in connection with the main CBA (70% Andorra; 30% do not travel), the social costs of the airport of Lleida are higher than the Reus Airport's costs only in the period 2011 - 2018.

  Therefore, in relation to the analysed scenarios, it can be stated that the Lleida - Alguaire Airport is more socially competitive than the Reus Airport

Scenario: CBA Lleida - Reus Airports	**Social Cost**	**Lleida-A. Airport is…**
70% Andorra; 30% don't travel	$COST_{Lleida} < COST_{Reus}$ $COST_{Lleida} > COST_{Reus}$ in 2011-2018	Socially competitive Not socially competitive from 2011 to 2018
70% Andorra; 30% Aigüestortes N.P.	$COST_{Lleida} < COST_{Reus}$	Socially competitive
70% Boí ; 30% Aigüestortes N.P.	$COST_{Lleida} < COST_{Reus}$	Socially competitive

Table 23: CBA Lleida - Reus Summary *(Own elaboration)*

- CBA: LLEIDA - BARCELONA

  Regarding the CBA Lleida - Barcelona analysed in the sensitivity analysis 2, it is demonstrated that the social costs of the Lleida - Alguaire Airport are lower than the social costs of the Barcelona Airport due to the fact that COSTlleida - COSTbarcelona < 0. Consequently, in order to bring English tourists to the Aigüestortes National Park and to Boí, from a social point of view, it is better to operate through the Lleida - Alguaire Airport than from the airport of Barcelona.

  Moreover, it has to be noted that the sensitivity analysis 2 scenario is the best for the Lleida - Alguaire Airport regarding social costs. In fact, the social costs of the different analysed scenarios have been summarized in the following table:

Scenario: CBA Lleida - BCN Airports	**Social Cost**	**Lleida-A. Airport is…**
70% Andorra; 30% don't travel	$COST_{Lleida} > COST_{BCN}$ in 2010-2037 $COST_{Lleida} < COST_{BCN}$ in 2037-2040	Not socially competitive (2010-2037) Socially competitive (2037-2040)
70% Andorra; 30% Aigüestortes N.P.	$COST_{Lleida} < COST_{BCN}$ in 2017-2040 $COST_{Lleida} > COST_{BCN}$ in 2011-2016	Socially competitive (2017-2040) Not socially competitive (2011-2016)
70% Boí ; 30% Aigüestortes N.P.	$COST_{Lleida} < COST_{BCN}$	Socially competitive

Table 24: CBA Lleida - Barcelona Summary *(Own elaboration)*

- CBA:LLEIDA - TOULOUSE

  In relation to the CBA Lleida - Toulouse carried out in the sensitivity analysis 2, it can be stated that the social costs of the Lleida - Alguaire Airport are higher than the social costs of the Toulouse Airport owing to the fact that COSTlleida - COSTtoulouse > 0. Hence, in order to bring English tourists to the Aigüestortes National Park and to Boí,

from a social point of view, it is better to use the airport of Toulouse than the airport of Lleida - Alguaire.
It has to be considered that, because of its better location, the Toulouse Airport functioning is better than the Lleida - Alguaire Airport functioning. In fact, in connection with the analyses realized, COSTlleida > COSTtoulouse in the three different scenarios that have been assumed.
Therefore, in relation to the analysed scenarios, it can be stated that the Lleida - Alguaire Airport is less socially competitive than the Toulouse Airport.

Scenario: CBA Lleida - Toulouse Airports	**Social Cost**	**Lleida-A. Airport is…**
70% Andorra; 30% don't travel	$COST_{Lleida} > COST_{Toulouse}$	Not socially competitive
70% Andorra; 30% Aigüestortes N.P.	$COST_{Lleida} > COST_{Toulouse}$	Not socially competitive
70% Boí ; 30% Aigüestortes N.P.	$COST_{Lleida} > COST_{Toulouse}$	Not socially competitive

Table 25: CBA Lleida - Toulouse Summary *(Own elaboration)*

To sum up, in relation to the sensitivity analysis 2 (70% Boí - 30% Aigüestortes N.P.), the Lleida - Alguaire Airport is the most socially competitive if compared with the airports of Reus, Girona and Barcelona. Nonetheless, in connection with the analysed scenarios, the social cost of the Lleida - Alguaire Airport is bigger than the social cost produced if the Toulouse Airport was used.

10.4.5.4 Sensitivity Analysis 3

The social competitiveness of the Lleida - Alguaire Airport has been analysed taking into account the scenario considered in the main cost-benefit analysis realized in this project, due to the fact that it is the most realistic: 70% of the English passengers that land in the Lleida - Alguaire Airport are keen on going to Andorra, whereas the other 30% of passengers remain in the airport where they land.
Therefore, the main objective of the sensitivity analysis 3 is to compute how many passengers the Lleida - Alguaire Airport ought to have so as to be profitable when compared with the other analysed airports. In fact, regarding each specific scenario, the number of passengers has been increased so as to achieve an Internal Rate of Return (IRR) equal to zero or equal to the applied discount rate (r=3'5%).
Furthermore, in relation to the necessary amount of passengers, demand has been obtain as follows:

- On the one hand, the real amount of passengers that have landed in the Lleida - Alguaire Airport from 2010 until 2016 has been considered.
- On the other hand, in relation to the period (2017 - 2040), the annual amount of passengers has been set according to the following lineal formula and depending on the amount of passengers in the last analysed year (2040):

$$V_{I(2016)}\,,\ V_{I+1(2017)}\,,\ldots\ldots\ldots\ldots\ V_{F(2040)}$$

$$r = \frac{V_{F(20040)}^{\frac{1}{n}}}{V_{I(2016)}}\ ;\ \text{n = (2040 - 2016)}$$

$$V_{I+1} = V_I \cdot r$$

Note that the entire calculations related to the sensitivity analysis 3 are shown in Annex 5. In fact, in relation to Annex 5 and regarding the item "other cash flow", it has been considered an

investment of (-90.000.000€) at the first year, a constant maintenance cost of (-78.700€) until the year 2039 and, eventually, a residual value of (+36.000.000€) at the last year.

Therefore, the following results have been obtained so as to ensure that the Lleida - Alguaire Airport is profitable when compared with each of the analysed airports:

CBA Lleida - Girona:

In connection with the calculations carried out, when analysing the CBA Lleida - Girona, it can be shown that if the number of annual passengers is increased, the social surcharge produced when operating from Lleida increases. In relation to the IRR criteria, if the number of annual passengers is increased, the IRR becomes more negative, thus it is not possible to achieve neither IRR = 0% nor IRR > 0%.

Consequently, it is not possible to make the Lleida - Alguaire Airport profitable if it is compared with Girona's Airport.

CBA Lleida - Reus:

In relation to the Lleida - Alguaire Airport, it has been computed that the following annual amount of passengers would be necessary so as to achieve a social Internal Rate of Return equal to 3'5% and equal to 0%, respectively (Annex 5):

- SOCIAL IRR = 3'5% ; ANNUAL PASSENGERS (year 2040)= 1.450.000

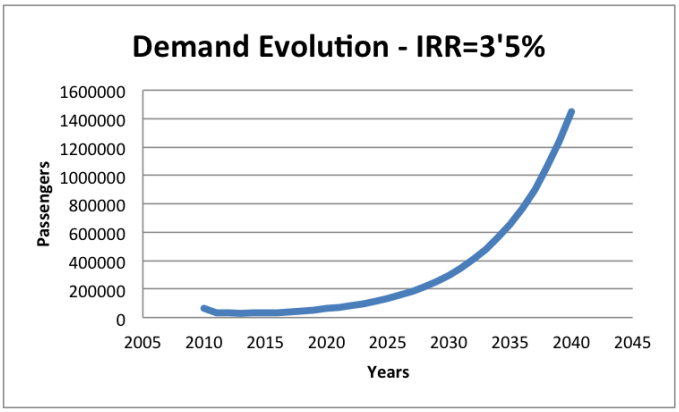

Figure 18: CBA Lleida - Reus, Demand evolution IRR=3'5% *(Own elaboration)*

- SOCIAL IRR = 0% ; ANNUAL PASSENGERS (year 2040) = 380.000

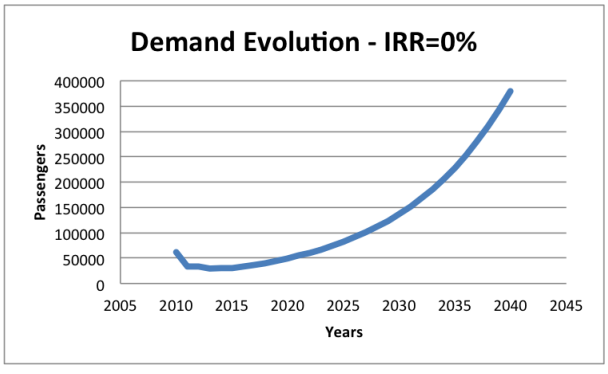

Figure 19: CBA Lleida - Reus, Demand evolution IRR=0% *(Own elaboration)*

Nevertheless, it has to be considered that Andorra would not be able to manage such an increase in relation to its demand, which would increase a 70% of the computed amount of passengers (1.015.000 passengers and 266.000 passengers, respectively).

CBA Lleida - Barcelona:

In relation to the Lleida - Alguaire Airport, it has been computed that the following annual amount of passengers would be necessary so as to achieve a social Internal Rate of Return equal to 3'5% and equal to 0%, respectively (Annex 5):

- SOCIAL IRR = 4% ; ANNUAL PASSENGERS (year 2040) = 3.153.100

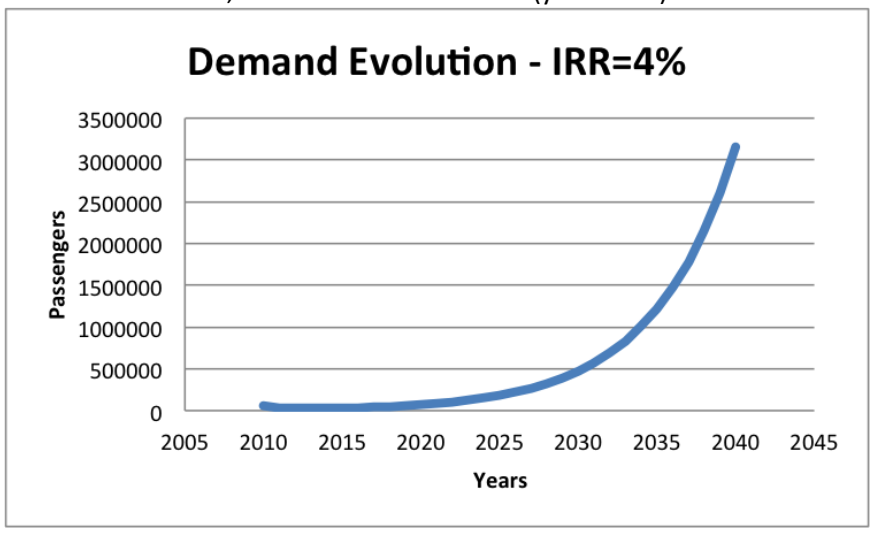

Figure 20: CBA Lleida - Barcelona, Demand evolution IRR=4% *(Own elaboration)*

- SOCIAL IRR = 0% ; ANNUAL PASSENGERS (year 2040) = 900.000

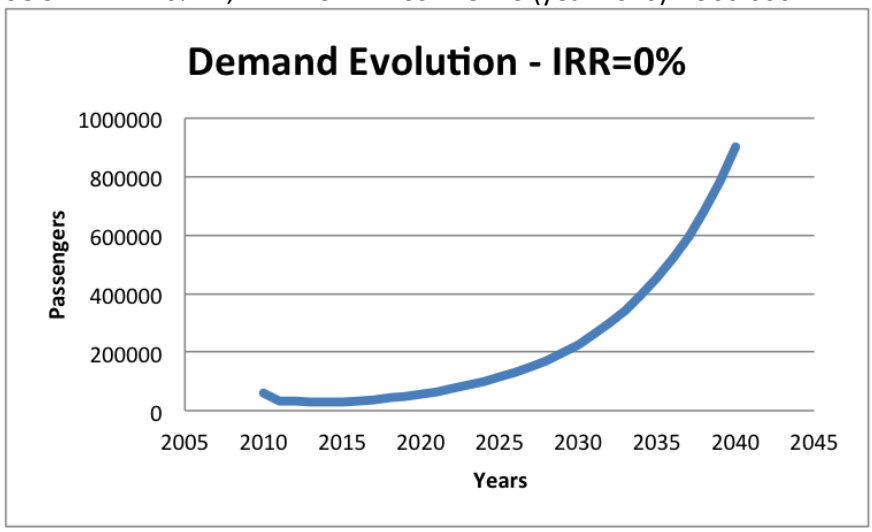

Figure 21: CBA Lleida - Barcelona, Demand evolution IRR=0% *(Own elaboration)*

Nonetheless, it has to be considered that Andorra would not be able to manage such an increase in relation to its demand, which would increase a 70% of the computed amount of passengers (2.207.170 passengers and 630.000 passengers, respectively).

CBA Lleida - Toulouse:

In connection with the calculations carried out, when analysing the CBA Lleida - Toulouse, it can be stated that if the number of annual passengers is increased, the social surcharge produced when operating from Lleida increases. In relation to the IRR criteria, if the number of annual passengers is increased, the IRR becomes more negative, thus it is not possible to achieve neither IRR = 0% nor IRR > 0%.

Consequently, it is not possible to make the Lleida - Alguaire Airport profitable if it is compared with the Airport of Toulouse.

Capacity of the Lleida - Alguaire Airport:

It is very important to analyse the capacity of the airport so as to know whether the infrastructure is able to manage the amount of passengers needed to ensure its profitability.

Hence, the capacity of the Lleida - Alguaire Airport is determined by its two boarding gates, which make the infrastructure able to board two aircrafts A-321 of 180 passengers each, per hour; therefore, providing that the airport was opened 24 hours per day, the Lleida - Alguaire Airport would have a maximum capacity of 48 flights A-321 per day. Furthermore, it has to be considered that the analysed charter aircrafts only operate at the airport at weekends and during the skiing season; hence, if it is assumed that the analysed charter aircrafts operate each weekend from September until March (both included), there are 28 available weekends, thus it has to be considered that the necessary passengers get to the airport along 28 days, due to the fact that charter flights only bring tourists to the Lleida - Alguaire Airport on Friday and take them back to their house on Sunday. Therefore, the following numbers of flights per day are obtained:

CBA	**Passengers to be profitable (year 2040)**	**Flights per day** (*airport opened 24hours/day - A321)*
CBA Lleida - Girona	----------	----------
CBA Lleida - Reus (IRR=0%)	380.000	76
CBA Lleida - Reus (IRR=3’5%)	1.450.000	288
CBA Lleida - BCN (IRR=0%)	900.000	179
CBA Lleida - BCN (IRR=4’0%)	3.153.100	626
CBA Lleida - Toulouse	----------	----------

Table 26: Capacity of the Lleida - Alguaire Airport
(Own Elaboration)

Therefore, despite the capacity of Andorra, the Lleida - Alguaire Airport would not be able to attend any of the necessary amount of passengers to make the airport profitable when compared with the other analysed infrastructures due to the fact that the maximum capacity of the Lleida - Alguaire Airport is to attend 48 flights A-321 per day.

Consequently, in relation to the sensitivity analysis 3, it is not possible to make the Lleida - Alguaire Airport profitable despite the fact that it had the necessary amount of passengers due to the fact that, because of its design and maximum capacity, it is not able to attend the amount of passengers that would be required so as to make the airport profitable when compared with the airports of Reus and Barcelona.

10.5 Future Scenario

In connection with the economic analysis and the Cost Benefit Analysis that has been realized, the Lleida - Alguaire Airport produces really low values of Internal Rate of Return and Net Present Value.

Therefore, so as to improve this situation, the non-monetized effects of the infrastructure regarding the economic development of the area ought to have a high positive effect so as to balance the current economic scenario. Furthermore, in connection with the analysis that has been realized, the Lleida - Alguaire Airport ought to promote mountain tourism regarding the Boí Taüll Resort and the Aigüestortes National Park, which are interesting touristic attractions relatively close to the airport, thus the road transport costs would be lower than in other airports.

In addition to this, if the initial investment cost had been lower through a periodic investment done in several phases, the economic profitability of the airport had been much better. In fact, owing to the variability in demand, the runway and a small terminal could have been constructed and, afterwards, according to the increase in demand, bigger facilities could have been designed.

According to the interview realized to the Lleida - Alguaire Airport's director, it would not be profitable to improve their visibility system in relation to foggy meteorological conditions. Nevertheless, according to the director, the airport is promoting other business activities so as to improve its economic scenario. For instance, several advertisement have been recorded within the airport and, in addition to this, the airport is opened both in the morning and in the afternoon regarding private pilots.

Actually, the Lleida - Alguaire Airport is keen on promoting itself as an infrastructure where new technology can be tested, such as automatic cars or antidrome antennas. Furthermore, regarding the small amount of commercial activity, it is also promoting itself as a place where air companies can both test and repair their aircrafts and train their pilots.

11. Conclusions

To sum up, this thesis has analysed the air transport, which is one of the most important modes of transport, and the airports, which are the necessary infrastructure so as to enable air transport.

Actually, the Lleida - Alguaire Airport has been economically and socially analysed so as to be able to answer the following question: *Regarding the air transport market scenario that used to exist before 2010, was it really necessary to invest 90 million euros so as to design and build the current airport of Lleida - Alguaire?*

So as to be able to answer the aforementioned question, the following analyses have been realized in this thesis:

- On the one hand, the Lleida - Alguaire Airport has been economically analysed and, in relation to this analysis, both negative NPV and negative IRR have been obtained, thus neither the investment nor the opportunity cost are balanced.
- On the other hand, the Lleida - Alguaire Airport has been socially analysed through a Cost Benefit Analysis and it has been compared with several airports that are located close to it. Regarding this analysis, both negative NPV and negative IRR have also been obtained.
- Furthermore, in order to deeply analyse the scenario of the Lleida - Alguaire Airport, three sensitivity analyses have been realized. In connection with these analyses, it can be stated that the economic and social scenario of the Lleida - Alguaire Airport would improve if the airport had an agreement with Boí Taüll Resort and Aigüestortes National Park, which are mountain touristic attractions which are located closer to the Lleida - Alguaire Airport than if Andorra is considered. Due to this fact, the Lleida - Alguaire Airport is more socially competitive because of its lower road transport costs.
  Moreover, it can be stated that the airport will never become completely profitable owing to the fact that, because of its maximum capacity, it would not be able to attend the high amount of passengers that would be necessary so as to become profitable.

Therefore, according to the values of NPV and IRR obtained, the aforementioned question can be answered: *Regarding the air transport market scenario that used to exist before 2010, it was not really necessary to invest 90 million euros so as to design and build the current airport of Lleida - Alguaire*.

Actually, due to the negative values of NPV and IRR that the Lleida - Alguaire Airport produces, it ought to promote its economic activity. In relation to this, the current director of the Lleida - Alguaire Airport is currently promoting new businesses in the infrastructure, such as advertisement recordings, pilots base training or the use of the runway so as to test new technology.
Furthermore, the negative results could be partially balanced regarding the non-monetized effects that the infrastructure might produce in relation to the local economic development.

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<u>ANNEX 1:</u> Interview to Antoni Serra, the current director of the Lleida - Alguaire Airport

Antoni Serra, in the Lleida - Alguaire Airport in 2010 (ACN)

Antoni Serra is the current director of the Lleida - Alguaire Airport; he substituted Alberto López (the former director).

He is an architect and he has a really wide experience in connection with commercial aviation, security and emergencies issues.

Antoni Serra already knew the functioning of this airport owing to the fact that he used to be the head of operations and security at the beginning of the infrastructure (from 2009 until 2012) and, in addition to this, he has also worked in several companies such as Vueling, Spanair and Air Europa.

Please note that the following interview has been carried out in Catalan.

1 - Quina metodologia es segueix per definir noves rutes o destinacions, horaris dels vols...?

És un tema que ve des del departament comercial d'Aeroports de Catalunya que són els que gestionen el tema de rutes i de comercialització, no només de l'aeroport de Lleida sinó també del de la Seu i també participen en els comitès de rutes que ajuden amb la gestió de rutes de Reus, Girona i Barcelona. Dintre d'Aeroports de Catalunya no només tractem a nivell de rutes i comercial l'aeroport de Lleida sinó que tractem també altres aeroports. Dins d'aquest aspecte general el que fem nosaltres és buscar de quina manera podem beneficiar l'aeroport de Lleida. En el cas que tenim nosaltres ens implica que nosaltres tenim un bon acord amb la companyia de AirNostrum i amb base a AirNostrum amb els estudis de rutes que vàrem fer nosaltres i varen fer ells es va determinar que una operació a les illes és viable perquè són "illes" i no es pot anar amb cotxe amunt i avall i aquest és un dels punts focals que es poden treure. Aleshores el que vam fer va ser operar un Palma , ja que veiem que la Universitat de Lleida atreu gent de Palma i aleshores tan sols amb els estudiants i la part de famílies quasi emplenem els avions. Això era una garantia de que podia funcionar i per això vam anar amb el Palma. I els Eivissa i Maó als estius, perquè és una destinació que de sempre aquí a Lleida ha funcionat i enlloc d'anar-se'n a Barcelona, doncs poden sortir d'aquí. Nosaltres hem calculat que la quantitat de gent que veiem que podem treure d'aquí i que els interessa sortir d'aquí directament és suficient pels avions que estem operant amb AirNostrum i per això ho hem fet amb ells. Els avions de AirNostrum van des de un ATR-72 que és el que va operar diumenge passat als CRJ, que són reactors, que van des de les 40 places fins a les 99-100 places, aleshores tenim des de reactors fins a turbohèlices i això ho juga la pròpia línia aèria amb base a les reserves que té: hi ha poques reserves doncs posa un crj-200, hi ha moltes reserves doncs posa un CRJ-1000. És a dir: és molt flexible en relació a quanta gent vola. Els altres estudis de posar avions més grans com un A-320 amb 180 places és molt difícil d'aconseguir comercialitzar aquí. El nostre problema és que tenim Barcelona a una hora i mitja en cotxe i s'hi pot sortir cada dia amb els preus que vulguis i cap on vulguis. El avió que ve a Lleida ja ve de Palma de Mallorca ple i se'n torna a Palma de Mallorca ple. El que no podem és portar un avió buit i portar-lo cap a Palma i tornar-lo a treure buit ja que a

nivell econòmic seria un desastre.

2 - És molt el temps que triga un avió des de que aterra fins que arriba al seu lloc de parada, distància que recórrer...?

No és molt, calcula que seran uns 4 minuts, des del moment que posa les rodes a terra fins al moment que li posem les falques, moment en què nosaltres diem "ha acabat el vol" i comença el temps de terra; venen a ser uns 4 minuts. També depèn del tipus d'avió, és a dir, si és un avió gran més pesat el temps de frenada és més llarg, se'n va més lluny, fa la volta i el temps de tornar és una mica més gran, podria ser en aquest cas 5 minuts, com a molt 6 minuts. Normalment és de 4 minuts. Si és un avió petit que frena dintre del lloc d'aterratge i agafa la sortida ràpida, en 2 minuts el tenim aparcat. No hi ha distàncies en aquest aeroport.

3 - Quina és la capacitat màxima de l'Aeroport?

La capacitat màxima ve donada per un paràmetre molt especial, que és "la porta d'embarcament". Jo, per porta d'embarcament, la capacitat màxima que puc fer és d'entre 2 i 3 o com a molt 4 avions a l'hora, depèn de la capacitat de passatgers que porten. Si són avions petits, doncs puc embarcar un avió petit cada mitja hora; tinc dues portes d'embarcament, doncs com a màxim com a màxim amb avions petits treballaria amb quatre avions l'hora. Amb avions grans, de 220 passatgers, tinc que treballar a dos avions l'hora, o tres si fossin dos de grans i un de petit. Encara que tingui un pàrquing de 5 avions i una capacitat de pista que em podria donar tranquil·lament 8-9 avions a l'hora a nivell de control aeri, estic limitat per les portes d'embarcament. Hauria de fer una inversió en infraestructura per augmentar la capacitat, cosa que de moment 2-3 avions a l'hora ja ho podem fer. A l'hivern, per vols d'esquiadors, vam treure 3 avions a l'hora grans, jugant una mica en el tema de treure passatgers d'un avió abans de l'altre però 3 avions a l'hora ho hem aconseguit fer (avions bastant grans).

4 - Em podria facilitar un registre/dir el nombre de dies que l'Aeroport ha estat afectat per la boira i el nombre d'avions afectats, pèrdues econòmiques...? En cas de boira, quin procés es segueix per anular una operació, a quin aeroport es desvia l'avió...?

Normalment està rodant una mitja de entre 2 dies d'afectació, algun any han estat 3 dies. Podríem dir 2'5 dies de boira a l'any per fer una mitja. Aquest any (2016-2017) hem tingut 4 dies de boira, però ha estat totalment excepcional. El normal és tenir 1 dia de boira en un any, un altre any tenim 3 dies de boira, un altre any en tenim 2... Una mitja de 2'5 dies a l'any de boira en els que hàgim hagut de desviar avions. Vull dir, de dies de boira n'hem tingut més de 2'5 dies, però que hàgim hagut de desviar avions serien una mitja de 2'5 dies de boira a l'any.

El procés per decidir si un avió es desvia és una mica especial. Nosaltres tenim un sistema d'aproximació instrumental, el ILS (Instrumental Landing System), que és categoria I, que ens deixa l'avió doncs a uns 60 metres... Necessitem 550 metres de visibilitat horitzontal i uns 60 metres de visibilitat vertical, que serien els 200 peus que deixa l'avió al límit. Aleshores, aquest sistema instrumental per boira, per Lleida, és molt adequat, i a nivell de sistema instrumental de boira per entrar en boira només hem tingut un avió que s'hagi desviat aquest any (2016-2017), pel que és realment el fet del sistema instrumental i la boira. El que passa és que nosaltres, a l'hivern, operem

un sistema de vols que no són regulars, és a dir, a part del vol a Palma, que és regular, operem vols charters que transporta els esquiadors. Els vols charters són els avions grans: els A-321. Els vols charters no es comercialitza comprant bitllets sinó que és el touroperador que ven un paquet d'hotel, esquí, menjar, forfait, assegurança, avió i allotjament. Aleshores, el client pertany al touroperador, que en aquest cas és Nielsen, que és el que comercialitza tot el paquet Andorra. Nielsen contracta Thomas Cook (companyia aèria), Fly B (companyia aèria), Germania (companyia aèria)... El que interessa al touroperador és les places que ha venut, i aquests avions venen aquí, però no com a companyia aèria que ven els bitllets, sinó com a transport dels passatgers i clients que ha fet Nielsen amb el paquet d'esquí. Aleshores qui mana a aquests passatgers és Nielsen: el que porta el control i són seus és Nielsen, el contracte de transport no és amb la companyia aèria sinó que és amb Nielsen. Per tant, Nielsen decideix el que s'ha de fer en situacions específiques. En el cas de la boira, què fem? En el cas de la boira, com que venen aquí (Lleida) cinc avions el diumenge, que són tots passatgers de Nielsen de Manchester, de Birmingham, de Gatwick... El touroperador, quan surt d'Andorra al dematí, paren a Pons amb els autobusos per descans del conductor, descans de passatgers... i a Pons, entre les 5:00 h i les 5:30 h del dematí, ens truquen i ens demanen el part meteorològic que tenim. Aleshores, la decisió es fa en base al part meteorològic que hi ha a les 5:15h - 5:30h del dematí, que moltes vegades fem un part i un segon esperant a que surti el segon per prendre la decisió, i la previsió que ens diu la empresa de meteorologia que ens ho escriu, ja que ho volen per escrit: la previsió diu que la boira no s'aixequi fins a mig dia, o que hi hagi un 20% de possibilitat de que s'aixequi entre les 12 h i les 14h... Aleshores, si el touroperador veu que pot haver-hi risc de que alguns dels avions no entri, o dos avions no entrin i els altres entrin... Si pot haver-hi el risc de que algun avió no entri, tots els passatgers se'n van a Reus. L'avió (que havia d'aterrar a l'Aeroport Lleida - Alguaire) ja no ve a fer l'aproximació instrumental, que segurament podria entrar sense problemes, perquè tenim un sistema que funciona, sinó que l'avió ja directament se'n va cap a Reus, ja ni intenta aproximar. És decisió del touroperador per una cosa: pel risc de que si porta els passatgers a l'Aeroport de Lleida - Alguaire, desembarques passatgers, es realitza la facturació de maletes, la porta d'embarcament, venen tots els autobusos aquí... i després dos avions se'n van a Reus i els altres tres possiblement entren, aleshores hem de tornar a desfacturar els passatgers que havíem facturat, tornar a entregar les maletes, tornar a carregar als autobusos aquells passatgers però potser els altres no... Quants autobusos s'han de portar a Reus per deixar suficients autobusos perquè els passatgers d'arribada que vinguin en els avions que entren puguin anar cap a Andorra... Les guies s'han de dividir... A nivell logístic és un gran problema que passi això, que de fet al principi va passar i va ser un desastre... Aleshores, portar aquests passatgers que hem desfacturat cap a Reus, resulta que l'avió que no ha entrat en 10 minuts està a Reus, però nosaltres triguem unes 2 hores i mitja en tornar a portar els passatgers a Reus en autobús, més tornar a facturar les maletes, tornar a facturar els passatgers, tornar a passar els rajos X i bandes de seguretat, embarcar passatgers... SEGUIRAl final l'avió va a Anglaterra amb 4 hores de retard, i els passatgers amb 4 hores de retard. Els passatgers d'arribada arriben a Reus, han d'esperar els autobusos que venen d'aquí i arriben amb 4 - 5 hores de retard a Andorra. Aquest retard comporta: que els passatgers d'arribada a Andorra no poden entrar als hotels a l'hora prevista, no poden agafar els forfaits a l'hora prevista, no poden llogar els esquís a les

hores previstes, i l'endemà perden mig dia d'esquí perquè han de fer totes les gestions al dematí, és a dir, molt enfadats els passatgers d'arribada. Pel que fa als passatgers de sortida, estan molt enfadats per les quatre hores de retràs en tornar a casa seva i dels seus familiars que els van a buscar... I la companyia aèria també està molt enfadada ja que aquestes quatre hores de retard que ha patit a primera hora del dematí significa que el vol que ha de fer a Canàries amb aquell avió, la tripulació ja no té hores de vol per anar i tornar perquè ha perdut quatre hores aquí. Aleshores han de canviar la tripulació i han de canviar l'avió. Aleshores, el cost que suposa per la companyia aèria canviar tota la tripulació, canviar tot l'avió... o arrastrar quatre hores de retràs si no poden canviar l'avió, amb una altra tripulació per fer que els passatgers de Canàries tinguin quatre hores de retràs d'anada i de tornada, amb les indemnitzacions que comporta el menjar... La bola de pilota de neu és tant enorme que el touroperador no s'ho pot permetre. Què passaria si des de l'Aeroport de Lleida - Alguaire diguéssim: "no, no, prova perquè jo vull la foto del diari El Segre que esteu entrant pel ILS". Doncs aquesta foto del diari El Segre podent entrar i es vegi que l'Aeroport de Lleida té un sistema molt bo, em comportaria que l'any següent el touroperador bloquegi i cancel·li l'acord. Què hem fet per evitar tot això i que Nielsen torni a firmar l'acord i que les companyies aèries tornin a firmar els acords amb Nielsen perquè no retrassem els seus avions, hem fet un procediment en el qual ells ens truquen al dematí des de Ponts, mirem i si la meteorologia ens dona les garanties de que els avions entren, venen i surten; si la meteorologia tenim un 60% de risc de que els avions no puguin entrar, se'n van cap a Reus i nosaltres desplacem el nostre personal cap a Reus per ajudar el touroperador amb les cadires de rodes, amb el llistat de passatgers... Els passatgers d'arribada i de sortida no tenen cap problema, no tenen cap retràs, pot haver-hi els 10-15 minuts de diferència de Ponts a Reus o de Ponts a Lleida, però als passatgers no els hi afecta sortir de Reus o de Lleida i tornen a casa seva a la hora que els hi toca, el passatger d'arribada arriba a Andorra a l'hora que li toca i la companyia aèria torna a Gatwick i Manchester a l'hora que li toca i no es retarda la tripulació. Aleshores tot va bé i a l'any següent tornem a renovar el contracte. Si jo dic: "no, no, vine i prova", si no entra hi ha una gran problemàtica i es divideixen els passatgers. En vols regulars, si un vol regular no entra i ha d'anar a Reus, és un vol regular i per tant els passatgers s'han d'espavilar i la companyia aèria els hi pagarà els taxis; en canvi els vols charters també porten els autobusos, han de fer la sortida de l'hotel amb els passatgers de sortida... està tot cronometrat i mil·limetrat per a fer tot el paquet de viatge.

5 - La instal·lació d'un sistema antiboira seria la solució per combatre aquest fenomen?

Invertir en un sistema de categoria superior no seria rentable. Si es volgués posar un categoria III, seria el mateix com si es volgués posar un categoria per naus espacials... Seria invertir els diners dels ciutadans d'una manera totalment innecessària. El sistema que tenim és perfectament viable pels vols que estem fent. Nosaltres tenim un sistema categoria I, però és una categoria I "superior" perquè estem utilitzant un categoria I en una pista d'aterratge de 61 metres d'ample que porta un eix de llum al mig que permet als avions baixar una mica més que un categoria I "normal" sense les llum d'eix de pista. És a dir: és un categoria I una mica més sofisticat. Sí que podríem passar a un categoria II-III, que permetria baixar l'avió una mica més, però la inversió necessària per posar un categoria II-III és "molt" forta per a que aquests metres de diferència que

em permet baixar més l'avió per prendre la decisió, ja que no seria aterratge automàtic, l'únic que baixes una mica més per prendre la decisió d'aterrar o no, no compensa la gran quantitat de diners que hem d'invertir per una cosa similar. A més a més, la boira que tenim aquí, com totes les boires, pot arribar a 100 metres, 30 metres o a 10 metres, i al cap d'una hora pot ser que tinguem 6 km de visibilitat. Fer una inversió tant gran per una cosa tant aleatòria que el primer dia d'haver fet aquesta inversió i l'avió s'hagués de tornar a desviar cap a Reus, seria molt criticat òbviament per haver gastat uns diners públics sense una justificació. La única justificació seria que els diaris demanen que s'instal·li un sistema antiboira, però la realitat és que el 90% dels avions que hem desviat per boira no han estat desviats pel tema purament de "boira", sinó que s'han desviat per decisió prèvia per evitar un risc, però no per boira. Estic segur que igualment que els d'Air Nostrum amb la boira que teníem anaven aterrant, els "charter" amb la professionalitat i pràctica que tenen a Anglaterra pel que fa als aterratges amb boira, també haguessin aterrat tots. Però aquest és un risc que el touroperador no vol assumir i a nosaltres ens interessa assegurar el contracte anual i que el touroperador Nielsen torni a firmar amb el nostre aeroport de Lleida - Alguaire.
El sistema ILS que tinc és perfecte pel meu aeroport, però no puc justificar la inversió necessària per instal·lar un sistema ILS categoria II-III, pel qual seria necessari retallar muntanyes, canviar la central elèctrica, remodelar la instal·lació lumínica... Si depèn de mi, mai diré que s'ha d'instal·lar un ILS de categoria superior a l'actual.

6 - Des del punt de vista financer, pel que fa al "compte de pèrdues i guanys de l'any 2014", s'observen unes "altres despeses d'explotació" elevades. A què es refereix?
Nosaltres tenim moltíssimes despeses d'explotació. Explotació podria incloure tot el que és la gestió aeroportuària, és a dir, el manteniment que he de fer d'aquest aeroport de mantenir els sistemes actius, sistemes de manteniment de la torre de control, dels radars, plans de vol, els sistemes d'explotació de bombers. A més a més, ara he de canviar les baranes que delimiten la senda de planeig del ILS (Instrumental Landing System) i aquestes baranes, que per obligació de l'autoritat aeroportuària han d'haver per a que ningú entri a dins de l'Aeroport perquè afectaria amb 14 decibels el grau d'inclinació de baixada de l'avió, han de ser frangibles per a que si una avioneta surt de la pista, ha de poder trencar les baranes i per tan les baranes no poden ser rígides. Han de tenir un certificat de frangibilitat i han de ser d'un component que deixi passar les ones del sistema d'aproximació. Així doncs, pel que fa al ILS i la barana requerida, fer només una barana em costarà 60.000 - 70.000 euros ja que ha d'estar tot certificat per si hi hagués alguna incidència ningú es faci mal. Aquest preu elevat és la diferència entre portar una granja a portar un aeroport: la gestió d'una granja és la mateixa que la d'un aeroport pel que fa al manteniment de costos i beneficis, entrades i sortides, material, alimentació, electricitat, calefacció... Però en un aeroport els costos són més elevats ja que hi ha un tema de "safety" pel mig.
A l'aeroport de Lleida - Alguaire no es treu beneficis del pàrquing. De fet, el pàrquing és un dels beneficis principals de tots els aeroports del món però l'Aeroport de Lleida - Alguaire no és un aeroport com qualsevol altre del món, sinó que és un aeroport que a nivell de tràfic comercial té poca capacitat, els divendres i els diumenges, i si dos dies d'operació comercial al passatger li haig de cobrar aquest pàrquing, al final se'n anirà. Vull intentar que aquest aeroport es mantingui al principi amb un costos per al client el més baixos possibles. Jo no puc jugar en la lliga dels "rics", és a dir, no tinc l'aeroport

ple d'avions com per a estar en condicions de treure el màxim benefici, sinó que jo estic engegant un aeroport que de fet porto 7 anys engegant l'aeroport, però continuo en el "start up" de l'aeroport, ja que no hem aconseguit atreure suficients vols comercials. Per això ara canviem la filosofia i fem ofertes de llançament. Dintre d'aquestes ofertes podria entrar el pàrquing gratuït. Si jo no tingués més places a l'aparcament, perquè s'emplena tant de passatgers que necessito fer un altre pàrquing, aleshores aquell pàrquing el pagaria amb les taxes que posaria d'aparcament, perquè voldria dir que l'aeroport funciona. Has de fer ofertes per a que la gent et conegui. A més a més, l'aparcament d'asfalt està bloquejat a l'hivern, no hi ha cap cotxe, i tots els cotxes estan a l'aparcament de grava. A l'hivern bloquegem l'aparcament d'asfalt per als autocars, ja que si deixo aparcar els cotxes a l'aparcament d'asfalt, els diumenges quan venen els autobusos del touroperador no hi caben.
Hem de jugar amb les característiques de l'aeroport que tenim.
La resta de "comptes de pèrdues i guanys" els aniran penjant a la web d'Aeroports de Catalunya, però és que varien molt poc d'un als altres ja que no hi ha hagut un canvi estructural dins del sistema de Lleida perquè hi hagi variacions. Un aeroport com aquest, la funció per la qual s'ha dissenyat no és per fer beneficis sinó per servir de plataforma perquè empreses privades o indústries facin benefici aprofitant-se de l'entorn. Per exemple, un hospital no està fet per fer beneficis, sinó per donar un servei social. L'aeroport s'ha instal·lat a Lleida per intentar que d'aquí en surtin altres coses, com lloguer de cotxes, restaurants, indústries... més activitat a l'entorn. Que jo obtingui més o menys beneficis no és l'objectiu. El meu objectiu és aportar aquí valor amb gent que hi pugui treballar. Després serà fantàstic si les meves tarifes em permeten recuperar la inversió feta. Però serà difícil ja que no tinc un pla de negoci perquè no sóc una indústria privada.

7 - En relació al transport de mercaderies, quina és la situació actual de l'Aeroport? Existeix duana i instal·lacions per fer-ho possible (càmera de fred, hangars, pista adequada...)? Hi ha una perspectiva de futur? L'Aeroport podria esdevenir una seu de distribució logística nacional? (tant de carn o fruita com d'altres productes com roba i materials diversos)
Actualment no s'està utilitzant l'aeroport per transport de mercaderies, i si depèn de mi, tampoc. Aquest aeroport, a l'inici, va ser dissenyat pel transport de mercaderies, amb possibilitats de fer càrrega. Si tu entres a l'aeroport des de la carretera veuràs que hi ha la torre de control i hi ha una separació que seria: passatgers a la dreta, i a l'esquerra hi hauria la càrrega, una zona que inicialment es va dissenyar per fer càrrega. A la part de passatgers es va fer una porta d'embarcament, petiteta, per avions regionals de 20 - 50 passatgers. Era el disseny: aviació regional i càrrega. Després es va dissenyar una pista més gran per mil motius: Virgin Galactic volia fer sortir l'avió que anava a fer l'estratosfera i la volta a l'espai, essent Lleida - Alguaire l'aeroport de sortida al sud d'Europa, aleshores vam fer una pista de 61 metres d'ample, que no és el normal ja que tenim una amplada tant o més gran que la de l'aeroport de Barcelona. Però es va mantenir una porta d'embarcament i per tant la capacitat era poder fer un avió a l'hora o un avió cada 45 minuts. Es va fer un acord amb unes companyies charter i venien 3 avions de 228 passatgers a l'hora, els quals amb una porta d'embarcament de 50 passatgers no funcionava. L'època que van succeir aquests contractes no hi havia diners per invertir a la Generalitat, ni tampoc

per invertir en ampliar una terminal només per un diumenge a la setmana durant els mesos d'hivern. No era ampliar la terminal perquè tot l'any hauria molts passatgers. Ens van dir que dissenyéssim alguna cosa que amb quatre duros poguéssim atendre la demanda dels touroperadors i els avions charter que vindrien. Què podíem fer a l'aeroport per a que, sense diners, es pogués atendre aquests avions? De plataforma en teníem, pista en teníem... Vam dir: farem una carpa molt gran al costat de la terminal actual, creant així una terminal provisional, pels hiverns... Aquella carpa valia molts diners i no es va poder instal·lar. Vam decidir agafar la part que estava destinada a mercaderies i vàrem fer "arribades". Pel que fa a les sortides, vam pensar en llogar o comprar una carpa de festa major col·locada al costat de la terminal, obrir una porta i posar-hi bancs per així tenir la porta d'embarcament. Així tindríem dues portes d'embarcament que ens suportarien 2 avions de 220 passatgers, que a vegades en tenim tres. També vàrem fer una altra carpa per tenir una zona de facturació amb 6 mostradors, ja que a la terminal només vàrem poder ampliar fins a 4 mostradors. Al darrera vam fer un altre embalat per posar les cintes de facturació de passatgers, els raigs X, els carretons per quan plou i fa fred... Així amb tres carpes, ja que la tercera era per en casos de que hi haguessin retards tenir un lloc on fer esperar els passatgers en un lloc on poder-lis donar el menjar, vam adaptar l'aeroport per poder fer tres avions charter sense invertir diners. Aquestes adaptacions encara funcionen, però la part de càrrega ja no està disponible.

Si féssim càrrega, podríem fer un altre embalat per atendre la càrrega. A nivell d'infraestructura necessitaria el que dius tu: càmera frigorífica, sanitat, un pif duaner, un pif de càrrega, uns agents de càrrega... Les instal·lacions necessàries per transportar càrrega. Em trobaria amb temes de duana, temes de tresoreria de l'estat espanyol, hisenda... Es demanen uns mínims d'instal·lacions. Hi ha una inversió molt forta. Aquesta inversió com la recuperes amb càrrega? Fem un benchmarking en l'entorn de Lleida per veure les fruites, les verdures, la carn, l'oli, el porc... tot el que s'està fent a Lleida i veure el mercat que tenim. Només mirant a nivell bàsic, el preu de transportar 1kg en un camió és de mitjana de 0'80euros - 1euro, depenent de la competitivitat que hi hagi i de la distància a recórrer. Aquesta càrrega la pots portar de Lleida a Barcelona o Amsterdam o a qualsevol altre aeroport que t'interessi a nivell transcontinental a un cost específic baix. Aquest camió tindrà els seus problemes per allà on estigui tornar a carregar càrrega cap aquí, però jugaràs. Si en canvi diem que volem treure la càrrega des de l'Aeroport de Lleida - Alguaire perquè sé que avui trec la càrrega i avui al vespre la tindré a Hong - Kong amb un avió, per anar a Hong - Kong necessitem un avió bastant curiós, ni un ATR ni un Airbus petit A-320, sinó que necessitem un avió de càrrega 777, 340, 330, Jumbo... el que té Saragossa per portar la roba de Zara. Un avió d'aquests al nostre aeroport no hi cap i per tant hauríem d'ampliar plataforma, ampliar taxiway, canviar les característiques de l'aeroport per pujar de 767-300 a un avió de càrrega gran... A més caldria fer una plataforma de càrrega. S'hauria de pensar què portaria l'avió de càrrega cap al nostre aeroport, ja que un avió de càrrega no admet "empty leg" com un charter, és a dir cal portar un avió de càrrega ple i aquest ha de tornar ple. El preu del quilogram de fruita per portar-la d'aquí cap a l'estranger també dificulta el seu transport amb avió, tenint en compte que moure un avió d'aquestes dimensions és molt car. La necessitat d'exportar amb avió hi és? O és millor utilitzar un camió més econòmic per portar la càrrega fins a Amsterdam i d'allí, amb la gran quantitat d'avions de càrrega que hi ha, et poden fer uns preus de transport més

bons? El cost de transportar un quilogram de fruita amb avió des de Lleida - Alguaire seria molt elevat i, a més, caldria afegir el cost de construir una terminal de càrrega. Segurament, cap subministrador de fruita de l'entorn de Lleida vol assumir aquest augment de costos per poder treure un quilogram de càrrega de l'Aeroport de Lleida - Alguaire. A mi, si em diuen que volen treure càrrega des del nostre aeroport, faig els números ràpid de portar un avió de càrrega de unes 20 - 30 tones des de Lleida fins a Buenos Aires amb l'ajuda dels brokers de Barcelona. Però aquest avió què portaria de tornada? Es pot mirar, calcular els costos i així sabríem el cost de la part operativa de treure un quilogram de càrrega de l'Aeroport de Lleida - Alguaire, tenint en compte que el cost d'inversió de crear la plataforma de transport és a càrrec del contribuent com a inversió de futur. El Govern hauria de destinar uns diners en crear les instal·lacions de transport necessàries enlloc d'invertir-los en sanitat o educació. Cal mirar en què invertim. Per aprofitar el que tenim, podríem fer una carpa petita i treure coses a nivell europeu, ja que així no caldria fer un pif aduaner (caldria pif aduaner per exportar a Anglaterra, ja que és no Schengen), però també caldria el control sanitari, gestió de càrrega, instal·lacions necessàries... Però per volar a Europa, el preu que ofereixen totes les empreses de camions, que aquí a Espanya n'hi ha moltes, és molt difícil superar-lo i els comerciants només acceptarien apostar pel transport aeri si aquest estès subvencionat, però l'administració no està disposada a ajudar a tots els comerciants de Lleida. Per exemple, per transportar blat, actualment es porta amb camió fins a Barcelona, on es carrega en un vaixell per portar-lo fins a la Xina; però pel preu al que es ven el blat, no surt a compte ni portar-lo en camió, millor vendre'l prop d'on es produeix.

Una fórmula coherent per fer viable el transport aeri seria presentar un estudi de negoci referent a mercaderia d'alt valor (és a dir, que un quilogram d'un determinat producte costés 300.000 euros). Llavors sí que seria interessant portar un article de gran valor a llarga distància amb un benefici considerable. Per exemple, hi ha companyies a les que els hi surt a compte llogar un avió empty leg per portar-lo a un lloc determinat ja que han localitzat les tonyines, les pesquen, les carreguen a l'avió el mateix vespre i estan a Tòquio l'endemà a primera hora. Però la tonyina es paga molt bé. En aquests casos, un alt valor del producte transportat podria justificar els costos d'una operació. En el nostre entorn seria complicat, ja que tot el que es fa òbviament té valor però no exportem joies, o material científic, o medicines caríssimes... Un tema diferent és si en lloc de transportar grans quantitats de mercaderies volguéssim fer "courier", és a dir, paqueteria, sí que es podria fer en el nostre aeroport. O transportar òrgans humans, que és d'un alt valor i es paga molt bé per les companyies d'assegurances per necessitats vitals d'una persona i es paga qualsevol preu per portar-ho ràpid, sí que seria possible en el nostre aeroport. El que no podem fer és la mercaderia estàndard (roba, fruita...). A més a més, la fruita és un producte molt fràgil i pel que fa a la roba tenim Saragossa molt a prop amb una organització logística de càrrega amb la que jo no podré competir. És el mateix pel que fa als passatgers i l'aeroport de Barcelona, ja que Barcelona pot oferir preus molt més competitius, ja que els clients són lliures i no tenen perquè volar des de Lleida; des de Barcelona poden volar quan volen, a la destinació que volen i amb el preu més baix que poden trobar. Portem 7 anys picant pedra i no ho hem aconseguit. Per tant, anem a buscar altres fonts de negoci pel nostre Aeroport de Lleida - Alguaire.

8 - En relació al transport de mercaderies, s'aplica la mateixa taxa aeroportuària per turisme que per transport de mercaderies? Quina és la taxa aplicada?
La taxa aeroportuària està publicada i la pots treure a la web de l'aeroport: preus de lloguer d'oficines, preus de lloguer d'aparcament, preu de passar la nit amb l'avió, bono de setmana, bono de dia, tarifa d'aterratge segons les tones que hi ha... Hi ha una llista de preus a la web d'Aeroports de Catalunya i varia en funció de les tones transportades.

9 - Pel que fa al transport de passatgers, es podria dir que l'Aeroport té els següents principals usuaris: turisme d'esquí, turisme de platja (illes) i turisme procedent de Tel-Aviv? En quin percentatge?
Els vols que uneixen Tel-Aviv amb Lleida-Alguaire són un vol charter: el tenim cada divendres fins a finals de Març, ara a l'abril ja no s'opera aquest vol, fins al proper desembre. Al desembre torna a començar el Arkia, i va haver un any que van venir uns vols a l'estiu, però es veu que no varen emplenar l'avió i els van cancel·lar. Jo aquest any vaig preguntar per repetir aquests vols d'estiu i de moment no tenim cap programació. Tenim molta competència a Barcelona.
Palma, Eivissa i Maó sí que estan assegurats per l'estiu: Palma el tenim tot l'any, i l'Eivissa i el Menorca els tenim des de inicis de juliols fins a mitjans de setembre, ja que funcionen.

10 - Pel que fa a les estratègies de futur, quines actuacions es preveu aplicar per incrementar l'ús de les instal·lacions? S'està potenciant l'ús de les instal·lacions mitjançant el rodatge d'anuncis publicitaris i com a entrenament de pilots de Vueling... Quin benefici se n'obté?
Indústria, logística, tecnologia, formació... Tot això són les estratègies de futur. És a dir: aquí estem firmant acords amb empreses de formar pilots de drons, estem fent estratègies per formar tot tipus de tècniques aeronàutiques, vull anar a lluitar per emmagatzemar avions tipus Terol, vull lluitar per fer hangars destinats a arreglar avions, pintar avions, netejar avions, mantenir avions... Tot això és el que ara volem lluitar i aconseguir perquè aquest aeroport tingui un rendiment i un funcionament i uns llocs de treball.
Després també volem fer formació, diferents tipus de formació per la que es necessiti un aeroport, ja sigui pilots d'avioneta, pilots de dron, mecànics, hostesses... També volem fer el futur desenvolupament de drons, grans i petits, els de 20kg i els de 4 tones, també hem treballat amb empreses de globus, també estic en contacte amb desenvolupament de cotxes automàtics elèctrics, ja que necessiten un espai com el nostre per fer proves, si falta espai a Tarragona doncs que puguin venir aquí... Qualsevol tipus d'operativa que aquest entorn li sigui favorable i que Barcelona no ho pugui fer, ja que a Barcelona hi ha moltes coses que no poden fer perquè estan tan col·lapsats de passatgers comercials que d'aquest tipus de coses no en volen sentir ni parlar. També podem invertir en millorar les infraestructures de formació, oferint als alumnes uns lloguers d'apartaments molt econòmics a l'entorn de l'aeroport, uns restaurants amb preus de menús fantàstics... Puc donar una sèrie de coses que Barcelona no pot donar.
També oferim a les companyies aèries l'anomenat "base training": ja que un pilot s'ha

de certificar pel tipus d'avió, ja que hi ha pilots que venen de MD's, de Boeing, i d'altres tipus d'avions, tu contractes un pilot i aquest pilot ha de tenir la llicència pel tipus d'avió que ha de portar, ha de fer a part de l'entrenament de simulador i teòric, ha de fer 6 aterratges i enlairaments amb l'avió de veritat, amb l'instructor al costat que li certifiqui si és un pilot vàlid per aquell tipus d'avió. Això s'ho paguen els mateixos pilots: si aquest curs d'habilitació de tipus val 28000 euros, després la companyia li garanteix uns anys de contracte per a que el pilot pugui recuperar la inversió realitzada. Aleshores els pilots van a buscar fer el curs a Polònia, Romania... allà on facin aquesta habilitació de tipus més barata. Jo li he dit a Vueling: tu tens un acord amb Aena que et fa un preu bàsic per tots els aeroports per fer-hi el "base training"; doncs jo he calculat els meus costos de control, de bombers, de terminal... que són la meitat de qualsevol preu d'Aena, m'he calculat un petit marge de benefici comercial i li he fet una oferta a Vueling. També he anat a AirEuropa, Evelop, Iberia, AirNostrum... Vueling ho ha valorat, ja que Lleida està a 10 minuts de vol de Barcelona i el nostre aeroport té un mínim de "safety alltitude" adequat ja que no hi ha cap obstacle en tot l'entorn, tenen ILS, tenen torre, i oferim la meitat de preu que Aena. A més a més, aquesta reducció del preu de fer l'entrenament, Vueling els hi ha descomptat als pilots, és a dir, no ho ha fet servir per tenir més beneficis, sinó que han reduït el preu del curs i han posat tres pilots més que sinó no haguessin anat a Vueling. Les altres companyies, de moment, no tenen necessitat de formació. Jo ara també faré un "mailing" per també anar a tots els aeroclubs i escoles de Catalunya i Aragó per promocionar l'aeroport.

L'any passat, per exemple, a les 17 hores de la tarda tancàvem l'aeroport per un tema de reducció de costos, però a l'estiu els pilots privats comencen a volar a partir de les 16h - 17h de la tarda ja que és quan el sol baixa i al migdia no es pot aguantar el sol en una avioneta i a 40 graus de temperatura. Aleshores volen a la tarda, que era l'hora que tancava l'aeroport i la gent es va acostumar a no venir a Lleida. Ara obrim des de les 9h del mati fins les 20:30h que és quan el sol baixa i la gent para de volar. Això ho he de fer sense que em costi més diners, ja que no podem pagar més personal ni bombers per estirar l'horari per a que "en teoria" (no és segur) vingui més gent. Per això hem agafat a gent que teníem a administració, l'hem formada per fer operacions, la posarem a la rotació d'operacions, tancarem la part administrativa per les tardes, els bombers els hem modificat per a que puguin estar més hores... Hem pres mesures perquè el nostre aeroport pugui tenir més hores d'operació a l'estiu i amb això puc fer un "mailing" a totes les escoles perquè tornin a venir a Lleida. Ara també comencem a muntar una antena antídroms que volem muntar a l'aeroport per demostrar a tots els aeroports del món com funcionaria un sistema antídroms per aeroport. Farem el que faci falta per portar tot el que sigui temes de desenvolupament, formació, aeroclubs... per a que el restaurant funcioni, hi hagin llocs de treball, es facin factures i fem de l'aeroport una plataforma logística a l'entorn de Lleida, sense deixar que l'aviació comercial marxi. Ara estem intentant potenciar unes opcions que els altres aeroports com de Reus, Girona o Barcelona no poden oferir.

També s'han gravat molts anuncis publicitaris, uns 6 o 7 anuncis gravats a l'any. Un anunci publicitari ens dona més diners que les taxes aeroportuàries que pugui cobrar de totes les avionetes a l'any amb un sol anunci publicitari. Però això són temes a més a més del que fem i no és un negoci fix, són coses que no controlem, no puc tenir un pressupost dels anuncis publicitaris que em vindran a l'any, ja que poden o no venir.

11 - Vostè creu que hi ha alguna relació entre el tren d'alta velocitat i l'Aeroport? SEGUIR

No m'influeix. Fer un vol que uneixi Lleida amb Madrid, que és el que funciona amb el tren d'alta velocitat, no em surt a compte tenint un AVE. Encara que no hi hagués AVE, el recorregut de carretera de Lleida a Madrid no és lo suficientment complicat, pesat o llarg com perquè la gent vingui a l'aeroport una hora abans, passi els raigs X, facturi, esperi l'avió, agafi l'avió, faci 40 minuts d'avió, arribi a Barajas, torna a recollir l'equipatge... Tot el procés aeroportuari és vàlid amb unes certes distàncies o en el cas d'illes i que la gent estigui interessada en viatjar-hi amb avió. Un aeroport com per exemple la Seu, que és petit, pot fer unes distàncies curtes però serà viable sempre i quan la destinació sigui d'interès per la gent. L'aeroport de la Seu no és competència per l'aeroport de Lleida-Alguaire ja que té un altre concepte totalment diferent.

Jo no faria un vol Lleida-Madrid perquè per la distància que hi ha no és pràctic per la gent. Un altre exemple és els nombrosos intents de connectar Girona amb Madrid mitjançant avió, ja que des de la Càmera de Comerç ho volien ja que sempre havien d'anar mitjançant Barcelona. Tothom ho va intentar però com que des de Barcelona havia un pont aeri que sortia cada hora, no va triomfar, ja que a Girona la gent havia d'agafar un vol a primera hora del matí i a última hora del vespre mentre des de Barcelona la gent podia anar i tornar a Madrid mitjançant el pont aeri a l'hora que més els anava bé.

12 - Pel que fa als vols destinats al turisme d'esquí procedents per exemple del Regne Unit, també hi ha llocs per ciutadans que vulguin viatjar de Lleida al Regne Unit o viceversa? O només estan pensats per turistes d'esquí? (vol UK-Lleida de la 1a setmana marxa vuit?; darrer vol Lleida-UK arriba a Lleida vuit?)

Els trajectes que porten esquiadors del Regne Unit a Andorra mitjançant l'Aeroport de Lleida - Alguaire són vols charter. Al començar la temporada d'esquí va d'Anglaterra a Lleida - Alguaire i aquest avió se'n va de Lleida - Alguaire vuit. S'anomena un "empty leg" i aquest avió va allà on la companyia aèria el necessiti. Nosaltres tenim els vols que venen de Manchester, Birmingham i Gatwick: ve de Manchester i torna a Manchester, venen de Gatwick i se'n tornen a Gatwick... A lo millor el primer vol de la temporada, l'avió fa Manchester - Lleida i després se l'emporten a Glasgow vuit. Està assumit dins del cost d'operació d'un vol charter que hi ha uns "empty legs" de primer de temporada i de final de temporada, ja que el darrer diumenge de la temporada l'avió arriba a l'Aeroport Lleida - Alguaire vuit i se'n torna ple per a portar els esquiadors a casa. Als vols charter, els "empty legs" sempre hi són. A vegades s'ha intentat comercialitzar els "empty legs". L'aeroport en si mateix no té un benefici dels passatgers ja que el benefici dels passatgers és per la companyia aèria, mentre que l'Aeroport Lleida - Alguaire té un benefici mínim mitjançant la taxa aeroportuària. El benefici mínim és degut a que l'Aeroport Lleida - Alguaire és una plataforma aeroportuària en l'entorn de Lleida, per atreure negocis d'aviació, ja sigui de manteniment, formació, transport de passatgers, logística, proves de noves tecnologies aeronàutiques, tecnologia general... Vull que les companyies aèries treguin beneficis amb els seus passatgers, ja que això significa que continuaran venint i a mi em pagaran les taxes aeroportuàries d'aterratge, les taxes de seguretat, el bar vendrà i tindrà beneficis i jo podré mantenir uns treballadors a l'Aeroport que donin feina a la

gent de l'entorn. De l' "empty leg" no trec benefici ja que només cobro la taxa d'aterratge, la taxa d'aproximació, la taxa de seguretat... Els "empty legs" ja els considera el "touroperador" en tots el paquets; en canvi, en vols regulars no existeixen els "empty legs" ja que comercialitza tots els vols, anada i tornada han d'estar plens, fins i tot el primer de la rotació. Per exemple, quan comencem la rotació ara de l'Eivissa i del Maó al Juliol, el primer vol que vingui d'Eivissa o de Maó ja vindrà ple, amb gent...

13 - Fa poc va sortir una notícia al diari en la que s'informava que els habitants propers a l'Aeroport s'havien alarmat pel soroll provocat per contínues operacions aèries realitzades al Aeroport per part de pilots de Vueling. Quines són les característiques que ofereix l'Aeroport pel que fa a la reducció d'impacte ambiental, nivells de soroll...?

L'estructura i el disseny arquitectònic és molt bo. A nivell operatiu interior jo hagués fet modificacions òbviament com tothom qui treballa veu els errors i problemes que hi ha. Però a nivell arquitectònic d'imatge és un bon aeroport i de fet s'ha emportat el premi al ser 1 dels 10 aeroports més macos de tot el món. Aleshores es va publicar un llibre i van sortir les fotos de l'Aeroport de Lleida-Alguaire i és un orgull per l'aeroport poder estar dins dels 10 aeroports més macos a nivell de disseny del món amb el petit que és.

A nivell ambiental està ben integrat, i a nivell de sorolls no tenim un problema perquè la població que hi ha a l'entorn de l'aeroport de Lleida-Alguaire no és gran: hi ha molts pobles i gent escampada, masies, la Saira, granges... aleshores el nivell de soroll que generem nosaltres no afecta a ningú. Per això no tenim un problema com té Barcelona que cada vegada que s'enlaira un avió surt el de Gavà i posa una denúncia al controlador que ha permès l'enlairament... A Barcelona tenen molts problemes a nivell mediambiental pel soroll dels avions.

14 - S'han realitzat enquestes als usuaris de l'aeroport?

Sí. S'ha fet des de Aeroports de Catalunya i s'ha fet benchmarking. Abans de posar el vol de Vueling, per exemple, es va fer un benchmarking a tota la comarca i província de Lleida per veure quina era la destinació que creien els usuaris que l'aeroport de Lleida-Alguaire havia de tenir, i va sortir amb un marge molt gran com a destí estrella París, la gent de Lleida volien un vol a París. No obstant, al cap de 3 o 4 mesos de posar el vol, es va produir una davallada en aquesta destinació, perquè es veu que tothom qui volia anar a París ja hi havia anat. Finalment, l'avió de 180 places que anava a París només portava 30-40 passatgers i per tant es perdien diners. A més a més, des de Lleida només teníem un avió que marxava el divendres i tornava el diumenge, i potser qui volia anar a París preferia marxar un dijous i tornar el dissabte, així que se n'anava a Barcelona, on hi ha uns 10 vols al dia que per preus molt competitius connecten amb París. Les nostres limitacions varen fer que el client canviés d'aeroport.

ANNEX 2: CONSIDERED PARAMETERS

COST LLEIDA ALGUAIRE AIRPORT - ANDORRA

Average Aircraft Speed (A-321)	800	km/h
Aircraft Capacity (A-321)	180	passengers
Air Distance (Gatwick - Lleida)	1400	km
Air Travel Time (Gatwick-Lleida)	1,75	hours
Distance (Lleida - Andorra)	159	km
Road Travel Time	2,2	hours
Bus Capacity	55	passengers
Road Travel Time (recreation)	7,31	€/(hour·person)
Air Travel Time (Recreation)	18,24	€/(hour·person)
Heavy Vehicles Functioning	0,85	€/(vehicle·km)
Bus Pollution Cost (Heavy Vehicles)	43,8	€/1.000 km
Bus Noise Cost	10,2	€/(1.000 vehicles·km)
Passengers' Aircraft Noise Cost	154,28	€/(1.000 vehicles·km)
Bus Driver Cost	16,91	€/(hour·vehicle)
Bus Average Fuel Consume	0,3	L/km
Bus Fuel Price	1,1029	€/L
Bus Accidents (1 Carriageway)	0,19	accidents/(million of veh/km)
Deaths (1 Carriageway)	0,1	deaths/accident
Serious injuries (1 Carriageway)	0,6	serious injuries/accident
Minor injuries (1 Carriageway)	0,95	minor injuries/accident
Accident - Affected vehicle	1809	€/vehicle
Accident - Minor injuries	16720	€/(injured person)
Accident - Serious injuries	217154	€/(injured person)
Accident - Deaths	1661294	€/(injured person)
First Pilot Cost	41,01	€/(hour flown)
Second Pilot	13,89	€/(hour flown)
Total Pilot Cost	54,9	€/(hour flown)
Aircraft Fuel Consume	5	L/km
Fuel (Kerosene) Price	0,38	€/L
CO2 Price (2010-2020)	28	€/ton
CO2 Price (2020-2030)	33	€/ton
CO2 Price (2030-2040)	41	€/ton
CO2 Emission (Civil-International)	114	g/(km·passenger)
Aircraft Noise Cost (passengers)	154,28	€/(1000vehicles·km)
Aircraft Functioning Cost	8,14	€/passenger
Airport's Surface	367	ha
Use of Land Cost (crops)	1981	€/ha

COST GIRONA AIRPORT - ANDORRA

Average Aircraft Speed (A-321)	800	km/h
Aircraft Capacity (A-321)	180	passengers
Air Distance (Gatwick-Girona)	1300	km
Air Travel Time (Gatwick-Girona)	1,625	hours
Distance (Girona-Andorra)	199	km
Road Travel Time	2,53	hours
Bus Capacity	55	passengers
Road Travel Time (recreation)	7,31	€/(hour·person)
Air Travel Time (recreation)	18,24	€/(hour·person)
Heavy Vehicles Functioning	0,85	€/(vehicle·km)
Bus Pollution Cost (Heavy Vehicles)	43,8	€/1.000 km
Bus Noise Cost	10,2	€/(1.000 vehicles·km)
Passengers' Aircraft Noise Cost	154,28	€/(1.000 vehicles·km)
Bus Driver Cost	16,91	€/(hour·vehicle)
Bus Average Fuel Consume	0,3	L/km
Bus Fuel Price	1,1029	€/L
Bus Accidents (Double Carriageway)	0,06	accidents/(million of veh/km)
Deaths (Double Carriageway)	0,13	deaths/accident
Serious injuries (Double Carriageway)	0,66	serious injuries/accident
Minor injuries (Double Carriageway)	1,11	minor injuries/accident
Accident - Affected vehicle	1809	€/vehicle
Accident - Minor injuries	16720	€/(injured person)
Accident - Serious injuries	217154	€/(injured person)
Accident - Deaths	1661294	€/(injured person)
First Pilot Cost	41,01	€/(hour flown)
Second Pilot	13,89	€/(hour flown)
Total Pilot Cost	54,9	€/(hour flown)
Aircraft Fuel Consume	5	L/km
Fuel (Kerosene) Price	0,38	€/L
CO2 Price (2010-2020)	28	€/ton
CO2 Price (2020-2030)	33	€/ton
CO2 Price (2030-2040)	41	€/ton
CO2 Emission (Civil-International)	114	g/(km·passenger)
Aircraft Noise Cost (passengers)	154,28	€/(1000vehicles·km)
Aircraft Functioning Cost	7,62	€/passenger

COST REUS AIRPORT - ANDORRA

Average Aircraft Speed (A-321)	800	km/h
Aircraft Capacity (A-321)	180	passengers
Air Distance (Gatwick-Reus)	1600	km
Air Travel Time (Gatwick-Reus)	2	hours
Distance (Reus-Andorra)	190	km
Road Travel Time	2,63	hours
Bus Capacity	55	passengers
Road Travel Time (recreation)	7,31	€/(hour·person)
Air Travel Time (recreation)	18,24	€/(hour·person)
Heavy Vehicles Functioning	0,85	€/(vehicle·km)
Bus Pollution Cost (Heavy Vehicles)	43,8	€/1.000 km
Bus Noise Cost	10,2	€/(1.000 vehicles·km)
Passengers' Aircraft Noise Cost	154,28	€/(1000 vehicles·km)
Bus Driver Cost	16,91	€/(hour·vehicle)
Bus Average Fuel Consume	0,3	L/km
Bus Fuel Price	1,1029	€/L
Bus Accidents (1 Carriageway)	0,19	accidents/(million of veh/km)
Deaths (1 Carriageway)	0,1	deaths/accident
Serious injuries (1 Carriageway)	0,6	serious injuries/accident
Minor injuries (1 Carriageway)	0,95	minor injuries/accident
Accident - Affected vehicle	1809	€/vehicle
Accident - Minor injuries	16720	€/(injured person)
Accident - Serious injuries	217154	€/(injured person)
Accident - Deaths	1661294	€/(injured person)
First Pilot Cost	41,01	€/(hour flown)
Second Pilot	13,89	€/(hour flown)
Total Pilot Cost	54,9	€/(hour flown)
Aircraft Fuel Consume	5	L/km
Fuel (Kerosene) Price	0,38	€/L
CO2 Price (2010-2020)	28	€/ton
CO2 Price (2020-2030)	33	€/ton
CO2 Price (2030-2040)	41	€/ton
CO2 Emission (Civil-International)	114	g/(km·passenger)
Aircraft Noise Cost (passengers)	154,28	€/(1000vehicles·km)
Aircraft Functioning Cost	9,17	€/passenger

COST BARCELONA AIRPORT - ANDORRA

Average Aircraft Speed (A-321)	800	km/h
Aircraft Capacity (A-321)	180	passengers
Air Distance (Gatwick-Barcelona)	1500	km
Air Travel Time (Gatwick-Barcelona)	1,875	hours
Distance (Barcelona-Andorra)	198	km
Road Travel Time	2,483	hours
Bus Capacity	55	passengers
Road Travel Time (recreation)	7,31	€/(hour·person)
Air Travel Time (recreation)	18,24	€/(hour·person)
Heavy Vehicles Functioning	0,85	€/(vehicle·km)
Bus Pollution Cost (Heavy Vehicles)	43,8	€/1.000 km
Bus Noise Cost	10,2	€/(1.000 vehicles·km)
Passengers' Aircraft Noise Cost	154,28	€/(1000 vehicles·km)
Bus Driver Cost	16,91	€/(hour·vehicle)
Bus Average Fuel Consume	0,3	L/km
Bus Fuel Price	1,1029	€/L
Bus Accidents (Double Carriageway)	0,06	accidents/(million of veh/km)
Deaths (Double Carriageway)	0,13	deaths/accident
Serious injuries (Double Carriageway)	0,66	serious injuries/accident
Minor injuries (Double Carriageway)	1,11	minor injuries/accident
Accident - Affected vehicle	1809	€/vehicle
Accident - Minor injuries	16720	€/(injured person)
Accident - Serious injuries	217154	€/(injured person)
Accident - Deaths	1661294	€/(injured person)
First Pilot Cost	41,01	€/(hour flown)
Second Pilot	13,89	€/(hour flown)
Total Pilot Cost	54,9	€/(hour flown)
Aircraft Fuel Consume	5	L/km
Fuel (Kerosene) Price	0,38	€/L
CO2 Price (2010-2020)	28	€/ton
CO2 Price (2020-2030)	33	€/ton
CO2 Price (2030-2040)	41	€/ton
CO2 Emission (Civil-International)	114	g/(km·passenger)
Aircraft Noise Cost (passengers)	154,28	€/(1000vehicles·km)
Aircraft Functioning Cost	8,65	€/passenger

COST TOULOUSE AIRPORT - ANDORRA

Average Aircraft Speed (A-321)	800	km/h
Aircraft Capacity (A-321)	180	passengers
Air Distance (Gatwick-Toulouse)	1100	km
Air Travel Time (Gatwick-Toulouse)	1,375	hours
Distance (Toulouse-Andorra)	193	km
Road Travel Time	2,63	hours
Bus Capacity	55	passengers
Road Travel Time (recreation)	7,31	€/(hour·person)
Air Travel Time (recreation)	18,24	€/(hour·person)
Heavy Vehicles Functioning	0,85	€/(vehicle·km)
Bus Pollution Cost (Heavy Vehicles)	43,8	€/1.000 km
Bus Noise Cost	10,2	€/(1.000 vehicles·km)
Passengers' Aircraft Noise Cost	154,28	€/(1000 vehicles·km)
Bus Driver Cost	16,91	€/(hour·vehicle)
Bus Average Fuel Consume	0,3	L/km
Bus Fuel Price	1,1029	€/L
Bus Accidents (Double Carriageway)	0,06	accidents/(million of veh/km)
Deaths (Double Carriageway)	0,13	deaths/accident
Serious injuries (Double Carriageway)	0,66	serious injuries/accident
Minor injuries (Double Carriageway)	1,11	minor injuries/accident
Accident - Affected vehicle	1809	€/vehicle
Accident - Minor injuries	16720	€/(injured person)
Accident - Serious injuries	217154	€/(injured person)
Accident - Deaths	1661294	€/(injured person)
First Pilot Cost	41,01	€/(hour flown)
Second Pilot	13,89	€/(hour flown)
Total Pilot Cost	54,9	€/(hour flown)
Aircraft Fuel Consume	5	L/km
Fuel (Kerosene) Price	0,38	€/L
CO2 Price (2010-2020)	28	€/ton
CO2 Price (2020-2030)	33	€/ton
CO2 Price (2030-2040)	41	€/ton
CO2 Emission (Civil-International)	114	g/(km·passenger)
Aircraft Noise Cost (passengers)	154,28	€/(1000vehicles·km)
Aircraft Functioning Cost	6,58	€/passenger

ANNEX 3:Financial Analysis and Costs Calculations

YEAR	Investment (€)	Residual Value (€)	Net import of the business revenue (€)	Supply (€)	Other exploitation revenue (€)	Staff expenses (€)	Other exploitation expenses (€)	Immobilized amortization (€)	Provision excess (€)	Other exploitation results (€)	Year Number (t)	Total Benefit / Year (€)	Total Cost / Year (€)	Total Cost / Year (€) - Absolute Value	NPV(€) - Bt/(1+r)^(t-1)	NPV(€) - Ct/(1+r)^(t-1)	Cash Flow / Year (€)
2010	-90000000,00	0,00	240534,06	-9915,28	347200,00	-490700,00	-78700,00	-3256600,00	0,00	88,53	1	587822,59	-93835915,28	93835915,28	587822,59	93835915,28	-93248092,69
2011	0,00	0,00	247973,25	-10221,94	347200,00	-490700,00	-78700,00	-3256600,00	0,00	91,27	2	595264,52	-3836221,94	3836221,94	575134,80	3706494,63	-3240957,42
2012	0,00	0,00	255642,53	-10538,08	347200,00	-490700,00	-78700,00	-3256600,00	0,00	94,09	3	602936,62	-3836538,08	3836538,08	562847,79	3581449,35	-3233601,46
2013	0,00	0,00	263549,00	-10864,00	347200,00	-490700,00	-78700,00	-3256600,00	0,00	97,00	4	610846,00	-3836864,00	3836864,00	550948,09	3460631,50	-3226018,00
2014	0,00	0,00	271700,00	-11200,00	347200,00	-490700,00	-78700,00	-3256600,00	0,00	100,00	5	619000,00	-3837200,00	3837200,00	539422,74	3343898,12	-3218200,00
2015	0,00	0,00	279851,00	-11536,00	347200,00	-490700,00	-78700,00	-3256600,00	0,00	103,00	6	627154,00	-3837536,00	3837536,00	528046,84	3231102,34	-3210382,00
2016	0,00	0,00	288246,53	-11882,08	347200,00	-490700,00	-78700,00	-3256600,00	0,00	106,09	7	635552,62	-3837882,08	3837882,08	517022,47	3122119,54	-3202329,46
2017	0,00	0,00	296893,93	-12238,54	347200,00	-490700,00	-78700,00	-3256600,00	0,00	109,27	8	644203,20	-3838238,54	3838238,54	506337,89	3016820,80	-3194035,34
2018	0,00	0,00	305800,74	-12605,70	347200,00	-490700,00	-78700,00	-3256600,00	0,00	112,55	9	653113,29	-3838605,70	3838605,70	495981,78	2915081,53	-3185492,40
2019	0,00	0,00	314974,77	-12983,87	347200,00	-490700,00	-78700,00	-3256600,00	0,00	115,93	10	662290,69	-3838983,87	3838983,87	485943,19	2816781,37	-3176693,18
2020	0,00	0,00	324424,01	-13373,39	347200,00	-490700,00	-78700,00	-3256600,00	0,00	119,41	11	671743,41	-3839373,39	3839373,39	476211,54	2721804,03	-3167629,97
2021	0,00	0,00	334156,73	-13774,59	347200,00	-490700,00	-78700,00	-3256600,00	0,00	122,99	12	681479,72	-3839774,59	3839774,59	466776,61	2630037,15	-3158294,87
2022	0,00	0,00	344181,43	-14187,82	347200,00	-490700,00	-78700,00	-3256600,00	0,00	126,68	13	691508,11	-3840187,82	3840187,82	457628,52	2541372,16	-3148679,72
2023	0,00	0,00	354506,87	-14613,46	347200,00	-490700,00	-78700,00	-3256600,00	0,00	130,48	14	701837,35	-3840613,46	3840613,46	448757,72	2455704,20	-3138776,11
2024	0,00	0,00	365142,08	-15051,86	347200,00	-490700,00	-78700,00	-3256600,00	0,00	134,39	15	712476,47	-3841051,86	3841051,86	440154,99	2372931,90	-3128575,39
2025	0,00	0,00	376096,34	-15503,42	347200,00	-490700,00	-78700,00	-3256600,00	0,00	138,42	16	723434,77	-3841503,42	3841503,42	431811,43	2292957,35	-3118068,65
2026	0,00	0,00	387379,23	-15968,52	347200,00	-490700,00	-78700,00	-3256600,00	0,00	142,58	17	734721,81	-3841968,52	3841968,52	423718,41	2215685,96	-3107246,71
2027	0,00	0,00	399000,61	-16447,58	347200,00	-490700,00	-78700,00	-3256600,00	0,00	146,85	18	746347,46	-3842447,58	3842447,58	415867,63	2141026,31	-3096100,11
2028	0,00	0,00	410970,63	-16941,00	347200,00	-490700,00	-78700,00	-3256600,00	0,00	151,26	19	758321,89	-3842941,00	3842941,00	408251,04	2068890,10	-3084619,12
2029	0,00	0,00	423299,75	-17449,24	347200,00	-490700,00	-78700,00	-3256600,00	0,00	155,80	20	770655,54	-3843449,24	3843449,24	400860,87	1999191,99	-3072793,69
2030	0,00	0,00	435998,74	-17972,71	347200,00	-490700,00	-78700,00	-3256600,00	0,00	160,47	21	783359,21	-3843972,71	3843972,71	393689,61	1931849,55	-3060613,50
2031	0,00	0,00	449078,70	-18511,89	347200,00	-505421,00	-78700,00	-3256600,00	0,00	165,28	22	796443,99	-3859232,89	3859232,89	386730,03	1873931,20	-3062788,91
2032	0,00	0,00	462551,06	-19067,25	347200,00	-505421,00	-78700,00	-3256600,00	0,00	170,24	23	809921,31	-3859788,25	3859788,25	379975,09	1810822,09	-3049866,94
2033	0,00	0,00	476427,59	-19639,27	347200,00	-505421,00	-78700,00	-3256600,00	0,00	175,35	24	823802,95	-3860360,27	3860360,27	373418,04	1749845,85	-3036557,32
2034	0,00	0,00	490720,42	-20228,45	347200,00	-505421,00	-78700,00	-3256600,00	0,00	180,61	25	838101,03	-3860949,45	3860949,45	367052,33	1690930,35	-3022848,41
2035	0,00	0,00	505442,04	-20835,30	347200,00	-505421,00	-78700,00	-3256600,00	0,00	186,03	26	852828,06	-3861556,30	3861556,30	360871,63	1634005,92	-3008728,23
2036	0,00	0,00	520605,30	-21460,36	347200,00	-505421,00	-78700,00	-3256600,00	0,00	191,61	27	867996,91	-3862181,36	3862181,36	354869,83	1579005,23	-2994184,45
2037	0,00	0,00	536223,46	-22104,17	347200,00	-505421,00	-78700,00	-3256600,00	0,00	197,36	28	883620,81	-3862825,17	3862825,17	349041,04	1525863,23	-2979204,36
2038	0,00	0,00	552310,16	-22767,29	347200,00	-505421,00	-78700,00	-3256600,00	0,00	203,28	29	899713,44	-3863488,29	3863488,29	343379,54	1474517,08	-2963774,86
2039	0,00	0,00	568879,46	-23450,31	347200,00	-505421,00	-78700,00	-3256600,00	0,00	209,38	30	916288,84	-3864171,31	3864171,31	337879,82	1424906,04	-2947882,47
2040	0,00	36000000,00	585945,85	-24153,82	347200,00	-505421,00	-78700,00	-3256600,00	0,00	215,66	31	36933361,51	-3864874,82	3864874,82	13158559,34	1376971,46	33068486,68
															26525013,22	**164542543,59**	

Profit and Loss Account (Aeroports de Catalunya, 2014)

FINANCIAL ANALYSIS	
RESULTS	
0,035	**r=3'5%**
-133.350.270,89 €	**NPV**
-9%	**IRR**

Aeroports de Catalunya

COMPTE DE PÈRDUES I GUANYS 2014	Aeroport Lleida-Alguaire	Aeroport Andorra-La Seu d'Urgell
Import net de la xifra de negocis	271,7	19,4
Aprovisionaments	-11,2	-8,2
Altres ingressos d'explotació	347,2	28,8
Despeses de personal	-490,7	-140,9
Altres despeses d'explotació	-3.256,6	-310,6
Amortització de l'immobilizat	-78,7	-140,1
Excessos de provisions	0,0	0,0
Deteriorament i resultat per alienació	1,9	-8,4
Altres resultats d'explotació	0,1	0,0
EBITDA	-3.137,5	-420,0
RESULTAT D' EXPLOTACIÓ	-3.216,2	-560,1
Ingressos financers	0,0	0,0
Despeses financeres	0,0	0,0
Diferències de canvi	0,0	0,0
RESULTAT FINANCER	0,0	0,0
RESULTAT ABANS D'IMPOSTOS	-3.216,2	-560,1
Impost sobre beneficis	0,0	0,0
RESULTAT DE L'EXERCICI	-3.216,2	-560,1

LLEIDA YEAR	TOTAL PASSENGERS	PYRENEES PASSENGERS (70%)	Road ravel Time COST (€)	Air Travel Time COST (€)	Heavy Vehicles functioning COST (€)	Bus Pollution COST (€)	Bus Noise COST (€)	Passengers' Aircraft Noise COST (€)	Bus Driver COST (€)	Bus Fuel COST (€)	Number of Bus Accidents	Bus Accidents COST (€)	Pilot COST (€)	Aircraft Fuel COST (€)	Aircraft Pollution COST (€)	Aircraft Noise COST (€)	Aircraft Functioning COST (€)	Use of Land COST (€)	TOTAL TRANSPORT COST / YEAR (€)
2010	61769	43238	1390716,68	2760333,07	212496,59	10949,82	2549,96	103768,08	58492,77	82716,17	4,69713E-07	8,07	65938,41	1825617,11	552066,61	148240,11	1005599,32	727027,00	8946519,78
2011	33000	23100	742988,40	1474704,00	113526,00	5849,93	1362,31	55437,95	31249,68	44191,00	2,50943E-07	4,31	35227,50	975333,33	294940,80	79197,07	537240	727027,00	5118279,27
2012	33041	23129	743911,51	1476536,21	113667,05	5857,20	1364,00	55506,82	31288,51	44245,90	2,51255E-07	4,32	35271,27	976545,11	295307,24	79295,46	537907,48	727027,00	5123735,07
2013	29443	20610	662903,26	1315748,78	101289,27	5219,38	1215,47	49462,41	27881,34	39427,74	2,23895E-07	3,85	31430,40	870204,22	263149,76	70660,58	479332,04	727027,00	4644955,51
2014	30400	21280	684449,92	1358515,20	104581,53	5389,02	1254,98	51070,11	28787,58	40709,28	2,31172E-07	3,97	32452,00	898488,89	271703,04	72957,30	494912	727027,00	4772301,82
2015	30200	21140	679946,96	1349577,60	103893,49	5353,57	1246,72	50734,12	28598,19	40441,46	2,29651E-07	3,95	32238,50	892577,78	269915,52	72477,32	491656	727027,00	4745688,17
2016	32900	23030	740736,92	1470235,20	113181,98	5832,20	1358,18	55269,95	31154,98	44057,09	2,50183E-07	4,30	35120,75	972377,78	294047,04	78957,08	535612	727027,00	5104972,45
2017	33887	23721	762959,03	1514342,26	116577,44	6007,17	1398,93	56928,05	32089,63	45378,80	2,57688E-07	4,43	36174,37	1001549,11	302868,45	81325,79	551680,36	727027,00	5236310,81
2018	34904	24433	785847,80	1559772,52	120074,76	6187,38	1440,90	58635,89	33052,32	46740,16	2,65419E-07	4,56	37259,60	1031595,58	311954,50	83765,56	568230,77	727027,00	5371589,33
2019	35951	25166	809423,23	1606565,70	123677,01	6373,00	1484,12	60394,97	34043,89	48142,37	2,73382E-07	4,70	38377,39	1062543,45	321313,14	86278,53	585277,69	727027,00	5510926,20
2020	37029	25920	833705,93	1654762,67	127387,32	6564,19	1528,65	62206,82	35065,21	49586,64	2,81583E-07	4,84	39528,71	1094419,76	390051,20	88866,88	602836,02	727027,00	5713541,84
2021	38140	26698	858717,11	1704405,55	131208,94	6761,12	1574,51	64073,02	36117,17	51074,24	2,90031E-07	4,98	40714,57	1127252,35	401752,74	91532,89	620921,11	727027,00	5863137,29
2022	39284	27499	884478,62	1755537,72	135145,21	6963,95	1621,74	65995,21	37200,68	52606,46	2,98732E-07	5,13	41936,01	1161069,92	413805,32	94278,88	639548,74	727027,00	6017220,59
2023	40463	28324	911012,98	1808203,85	139199,56	7172,87	1670,39	67975,07	38316,70	54184,66	3,07693E-07	5,29	43194,09	1195902,02	426219,48	97107,24	658735,20	727027,00	6175926,40
2024	41677	29174	938343,37	1862449,96	143375,55	7388,06	1720,51	70014,32	39466,20	55810,20	3,16924E-07	5,44	44489,92	1231779,08	439006,06	100020,46	678497,26	727027,00	6339393,38
2025	42927	30049	966493,67	1918323,46	147676,81	7609,70	1772,12	72114,75	40650,19	57484,50	3,26432E-07	5,61	45824,61	1268732,45	452176,24	103021,07	698852,17	727027,00	6507764,38
2026	44215	30950	995488,48	1975873,17	152107,12	7837,99	1825,29	74278,19	41869,69	59209,04	3,36225E-07	5,78	47199,35	1306794,42	465741,53	106111,71	719817,74	727027,00	6681186,50
2027	45541	31879	1025353,13	2035149,36	156670,33	8073,13	1880,04	76506,54	43125,78	60985,31	3,46312E-07	5,95	48615,33	1345998,26	479713,78	109295,06	741412,27	727027,00	6859811,28
2028	46908	32835	1056113,73	2096203,84	161370,44	8315,32	1936,45	78801,74	44419,56	62814,87	3,56701E-07	6,13	50073,79	1386378,20	494105,19	112573,91	763654,64	727027,00	7043794,81
2029	48315	33820	1087797,14	2159089,96	166211,56	8564,78	1994,54	81165,79	45752,14	64699,31	3,67402E-07	6,31	51576,01	1427969,55	508928,35	115951,13	786564,28	727027,00	7233297,84
2030	49764	34835	1120431,05	2223862,66	171197,90	8821,73	2054,37	83600,76	47124,71	66640,29	3,78424E-07	6,50	53123,29	1470808,64	651274,06	119429,66	810161,21	727027,00	7555563,84
2031	51257	35880	1154043,99	2290578,54	176333,84	9086,38	2116,01	86108,79	48538,45	68639,50	3,89777E-07	6,70	54716,98	1514932,89	670812,29	123012,55	834466,04	727027,00	7760419,94
2032	52795	36956	1188665,31	2359295,89	181623,86	9358,97	2179,49	88692,05	49994,60	70698,69	4,0147E-07	6,90	56358,49	1560380,88	690936,65	126702,93	859500,03	727027,00	7971421,73
2033	54379	38065	1224325,26	2430074,77	187072,57	9639,74	2244,87	91352,81	51494,44	72819,65	4,13514E-07	7,10	58049,25	1607192,31	711664,75	130504,02	885285,03	727027,00	8188753,57
2034	56010	39207	1261055,02	2502977,01	192684,75	9928,93	2312,22	94093,40	53039,27	75004,24	4,2592E-07	7,32	59790,73	1655408,08	733014,70	134419,14	911843,58	727027,00	8412605,37
2035	57690	40383	1298886,67	2578066,32	198465,29	10226,80	2381,58	96916,20	54630,45	77254,37	4,38697E-07	7,54	61584,45	1705070,32	755005,14	138451,71	939198,88	727027,00	8643172,72
2036	59421	41595	1337853,27	2655408,31	204419,25	10533,60	2453,03	99823,68	56269,37	79572,00	4,51858E-07	7,76	63431,98	1756222,43	777655,29	142605,26	967374,85	727027,00	8880657,09
2037	61204	42843	1377988,87	2735070,56	210551,83	10849,61	2526,62	102818,39	57957,45	81959,16	4,65414E-07	8,00	65334,94	1808909,10	800984,95	146883,42	996396,10	727027,00	9125265,99
2038	63040	44128	1419328,54	2817122,68	216868,38	11175,10	2602,42	105902,95	59696,17	84417,93	4,79376E-07	8,24	67294,99	1863176,37	825014,50	151289,92	1026287,98	727027,00	9377213,16
2039	64931	45452	1461908,39	2901636,36	223374,43	11510,35	2680,49	109080,03	61487,06	86950,47	4,93758E-07	8,48	69313,84	1919071,67	849764,93	155828,62	1057076,62	727027,00	9636718,75
2040	66879	46815	1505765,65	2988685,45	230075,67	11855,66	2760,91	112352,43	63331,67	89558,98	5,0857E-07	8,74	71393,25	1976643,82	875257,88	160503,48	1088788,92	727027,00	9904009,50

GIRONA YEAR	TOTAL PASSENGERS	PYRENEES PASSENGERS (70%)	Road Travel Time COST (€)	Air Travel Time COST (€)	Heavy Vehicles Functioning COST (€)	Bus Pollution COST (€)	Bus Noise COST (€)	Passengers' Aircraft Noise COST (€)	Bus Driver COST (€)	Bus Fuel COST (€)	Number of Bus Accidents	Bus Accidents COST (€)	Pilot COST (€)	Aircraft Fuel COST (€)	Aircraft Pollution COST (€)	Aircraft Noise COST (€)	Aircraft Functioning COST (€)	Use of Land COST (€)	TOTAL TRANSPORT COST / YEAR (€)
2010	61769	43238	1599324,18	2563166,42	265954,85	13704,50	3191,46	96356,07	67266,69	103525,27	1,18515E-07	2,46	61228,52	1695215,89	512633,28	137651,53	941359,56	0,00	8060580,70
2011	33000	23100	854436,66	1369368,00	142086,00	7321,61	1705,03	51478,09	35937,13	55308,2292	6,33166E-08	1,32	32711,25	905666,67	273873,60	73540,13	502920,00	0,00	4306353,72
2012	33041	23129	855498,23	1371069,34	142262,53	7330,70	1707,15	51542,05	35981,78	55376,94548	6,33952E-08	1,32	32751,89	906791,89	274213,87	73631,50	503544,84	0,00	4311704,04
2013	29443	20610	762338,74	1221766,73	126770,85	6532,43	1521,25	45929,38	32063,54	49346,6725	5,64918E-08	1,17	29185,37	808046,78	244353,35	65613,40	448711,32	0,00	3842180,99
2014	30400	21280	787117,41	1261478,40	130891,35	6744,75	1570,70	47422,24	33105,72	50950,61114	5,8328E-08	1,21	30134,00	834311,11	252295,68	67746,06	463296,00	0,00	3967065,25
2015	30200	21140	781939,00	1253179,20	130030,22	6700,38	1560,36	47110,26	32887,92	50615,40975	5,79443E-08	1,20	29935,75	828822,22	250635,84	67300,36	460248,00	0,00	3940966,13
2016	32900	23030	851847,46	1365218,40	141655,44	7299,42	1699,87	51322,10	35828,23	55140,62851	6,31247E-08	1,31	32612,13	902922,22	273043,68	73317,28	501396,00	0,00	4293304,16
2017	33887	23721	877402,88	1406174,95	145905,10	7518,40	1750,86	52861,76	36903,08	56794,84736	6,50185E-08	1,35	33590,49	930009,89	281234,99	75516,80	516437,88	0,00	4422103,29
2018	34904	24433	903724,97	1448360,20	150282,25	7743,96	1803,39	54447,61	38010,17	58498,69278	6,6969E-08	1,39	34598,20	957910,19	289672,04	77782,31	531931,02	0,00	4554766,39
2019	35951	25166	930836,72	1491811,01	154790,72	7976,27	1857,49	56081,04	39150,48	60253,65356	6,89781E-08	1,43	35636,15	986647,49	298362,20	80115,78	547888,95	0,00	4691409,38
2020	37029	25920	958761,82	1536565,34	159434,44	8215,56	1913,21	57763,47	40324,99	62061,26317	7,10474E-08	1,48	36705,23	1016246,92	362190,40	82519,25	564325,62	0,00	4887028,99
2021	38140	26698	987524,67	1582662,30	164217,47	8462,03	1970,61	59496,38	41534,74	63923,10107	7,31788E-08	1,52	37806,39	1046734,32	373056,11	84994,83	581255,38	0,00	5033639,86
2022	39284	27499	1017150,41	1630142,17	169144,00	8715,89	2029,73	61281,27	42780,78	65840,7941	7,53742E-08	1,57	38940,58	1078136,35	384247,80	87544,67	598693,05	0,00	5184649,06
2023	40463	28324	1047664,93	1679046,43	174218,32	8977,37	2090,62	63119,71	44064,21	67816,01792	7,76354E-08	1,61	40108,80	1110480,44	395775,23	90171,01	616653,84	0,00	5340188,53
2024	41677	29174	1079094,87	1729417,82	179444,87	9246,69	2153,34	65013,30	45386,13	69850,49846	7,99645E-08	1,66	41312,06	1143794,86	407648,49	92876,14	635153,45	0,00	5500394,19
2025	42927	30049	1111467,72	1781300,36	184828,21	9524,09	2217,94	66963,70	46747,72	71946,01341	8,23634E-08	1,71	42551,43	1178108,70	419877,94	95662,43	654208,06	0,00	5665406,01
2026	44215	30950	1144811,75	1834739,37	190373,06	9809,81	2284,48	68972,61	48150,15	74104,39382	8,48343E-08	1,76	43827,97	1213451,96	432474,28	98532,30	673834,30	0,00	5835368,19
2027	45541	31879	1179156,10	1889781,55	196084,25	10104,11	2353,01	71041,79	49594,65	76327,52563	8,73794E-08	1,82	45142,81	1249855,52	445448,51	101488,27	694049,33	0,00	6010429,24
2028	46908	32835	1214530,79	1946475,00	201966,78	10407,23	2423,60	73173,04	51082,49	78617,3514	9,00007E-08	1,87	46497,09	1287351,19	458811,96	104532,92	714870,81	0,00	6190742,12
2029	48315	33820	1250966,71	2004869,25	208025,78	10719,45	2496,31	75368,23	52614,97	80975,87194	9,27008E-08	1,93	47892,01	1325971,72	472576,32	107668,90	736316,93	0,00	6376464,38
2030	49764	34835	1288495,71	2065015,32	214266,56	11041,03	2571,20	77629,28	54193,41	83405,1481	9,54818E-08	1,98	49328,77	1365750,88	604754,49	110898,97	758406,44	0,00	6685759,19
2031	51257	35880	1327150,58	2126965,78	220694,55	11372,26	2648,33	79958,16	55819,22	85907,30254	9,83462E-08	2,04	50808,63	1406723,40	622897,12	114225,94	781158,63	0,00	6886331,96
2032	52795	36956	1366965,10	2190774,76	227315,39	11713,43	2727,78	82356,90	57493,79	88484,52162	1,01297E-07	2,11	52332,89	1448925,10	641584,04	117652,72	804593,39	0,00	7092921,92
2033	54379	38065	1407974,05	2256498,00	234134,85	12064,83	2809,62	84827,61	59218,61	91139,05727	1,04336E-07	2,17	53902,87	1492392,86	660831,56	121182,30	828731,19	0,00	7305709,58

2034	56010	39207	1450213,28	2324192,94	241158,90	12426,78	2893,91	87372,44	60995,17	93873,22899	1,07466E-07	2,23	55519,96	1537164,64	680656,50	124817,77	853593,13	0,00	7524880,87
2035	57690	40383	1493719,67	2393918,73	248393,67	12799,58	2980,72	89993,61	62825,02	96689,42585	1,1069E-07	2,30	57185,56	1583279,58	701076,20	128562,30	879200,92	0,00	7750627,29
2036	59421	41595	1538531,26	2465736,29	255845,48	13183,57	3070,15	92693,42	64709,77	99590,10863	1,1401E-07	2,37	58901,13	1630777,97	722108,48	132419,17	905576,95	0,00	7983146,11
2037	61204	42843	1584687,20	2539708,38	263520,84	13579,07	3162,25	95474,22	66651,06	102577,8119	1,17431E-07	2,44	60668,16	1679701,31	743771,74	136391,75	932744,26	0,00	8222640,49
2038	63040	44128	1632227,82	2615899,63	271426,46	13986,45	3257,12	98338,45	68650,60	105655,1462	1,20953E-07	2,51	62488,20	1730092,35	766084,89	140483,50	960726,58	0,00	8469319,71
2039	64931	45452	1681194,65	2694376,62	279569,26	14406,04	3354,83	101288,60	70710,11	108824,8006	1,24582E-07	2,59	64362,85	1781995,12	789067,44	144698,00	989548,38	0,00	8723399,30
2040	66879	46815	1731630,49	2775207,92	287956,34	14838,22	3455,48	104327,26	72831,42	112089,5447	1,2832E-07	2,67	66293,74	1835454,97	812739,46	149038,94	1019234,83	0,00	8985101,28

REUS YEAR	TOTAL PASSENGERS	PYRENEES PASSENGERS (70%)	Road Travel Time COST (€)	Air Travel Time COST (€)	Heavy Vehicles Functioning COST (€)	Bus Pollution COST (€)	Bus Noise COST (€)	Passengers' Aircraft Noise COST (€)	Bus Driver COST (€)	Bus Fuel COST (€)	Number of Bus Accidents	Bus Accidents COST (€)	Pilot COST (€)	Aircraft Fuel COST (€)	Aircraft Pollution COST (€)	Aircraft Noise COST (€)	Aircraft Functioning COST (€)	Use of Land COST (€)	TOTAL TRANSPORT COST / YEAR (€)
2010	61769	43238	1662538,58	3154666,37	253926,74	13084,70	3047,12	118592,09	69925,45	98843,23	3,93075E-07	6,75	75358,18	2086419,56	630933,27	169417,27	1132843,46	0,00	9469602,76
2011	33000	23100	888208,86	1685376,00	135660,00	6990,48	1627,92	63357,65	37357,57	52806,85	0,00000021	3,61	40260,00	1114666,67	337075,20	90510,93	605220,00	0,00	5059121,74
2012	33041	23129	889312,39	1687469,95	135828,55	6999,17	1629,94	63436,37	37403,99	52872,46	2,10261E-07	3,61	40310,02	1116051,56	337493,99	90623,39	605971,94	0,00	5065407,32
2013	29443	20610	792470,71	1503712,90	121037,50	6236,99	1452,45	56528,47	33330,88	47114,91	1,87365E-07	3,22	35920,46	994519,11	300742,58	80754,95	539984,62	0,00	4513809,74
2014	30400	21280	818228,77	1552588,80	124971,64	6439,71	1499,66	58365,84	34414,25	48646,31	1,93455E-07	3,32	37088,00	1026844,44	310517,76	83379,77	557536,00	0,00	4660524,27
2015	30200	21140	812845,68	1542374,40	124149,45	6397,35	1489,79	57981,85	34187,84	48326,27	1,92182E-07	3,30	36844,00	1020088,89	308474,88	82831,22	553868,00	0,00	4629862,93
2016	32900	23030	885517,32	1680268,80	135248,91	6969,30	1622,99	63165,66	37244,37	52646,83	2,09364E-07	3,60	40138,00	1111288,89	336053,76	90236,66	603386,00	0,00	5043791,07
2017	33887	23721	912082,84	1730676,86	139306,38	7178,38	1671,68	65060,63	38361,70	54226,24	2,15645E-07	3,70	41342,14	1144627,56	346135,37	92943,76	621487,58	0,00	5195104,81
2018	34904	24433	939445,32	1782597,17	143485,57	7393,73	1721,83	67012,45	39512,55	55853,02	2,22114E-07	3,82	42582,40	1178966,38	356519,43	95732,07	640132,21	0,00	5350957,95
2019	35951	25166	967628,68	1836075,09	147790,13	7615,54	1773,48	69022,82	40697,93	57528,61	2,28777E-07	3,93	43859,88	1214335,37	367215,02	98604,03	659336,17	0,00	5511486,69
2020	37029	25920	996657,54	1891157,34	152223,84	7844,00	1826,69	71093,51	41918,86	59254,47	2,35641E-07	4,05	45175,67	1250765,43	445772,80	101562,15	679116,26	0,00	5744372,62
2021	38140	26698	1026557,27	1947892,06	156790,55	8079,33	1881,49	73226,31	43176,43	61032,11	2,4271E-07	4,17	46530,94	1288288,40	459145,99	104609,02	699489,75	0,00	5916703,80
2022	39284	27499	1057353,99	2006328,82	161494,27	8321,70	1937,93	75423,10	44471,72	62863,07	2,49991E-07	4,29	47926,87	1326937,05	472920,36	107747,29	720474,44	0,00	6094204,91
2023	40463	28324	1089074,61	2066518,68	166339,10	8571,36	1996,07	77685,79	45805,87	64748,96	2,57491E-07	4,42	49364,68	1366745,16	487107,98	110979,71	742088,67	0,00	6277031,06
2024	41677	29174	1121746,84	2128514,24	171329,27	8828,50	2055,95	80016,37	47180,05	66691,43	2,65216E-07	4,56	50845,62	1407747,52	501721,21	114309,10	764351,33	0,00	6465341,99
2025	42927	30049	1155399,25	2192369,67	176469,15	9093,35	2117,63	82416,86	48595,45	68692,17	2,73172E-07	4,69	52370,99	1449979,94	516772,85	117738,37	787281,87	0,00	6659302,25
2026	44215	30950	1190061,23	2258140,76	181763,22	9366,15	2181,16	84889,37	50053,32	70752,94	2,81367E-07	4,83	53942,12	1493479,34	532276,04	121270,52	810900,33	0,00	6859081,32
2027	45541	31879	1225763,06	2325884,98	187216,12	9647,14	2246,59	87436,05	51554,91	72875,53	2,89808E-07	4,98	55560,38	1538283,72	548244,32	124908,64	835227,34	0,00	7064853,76
2028	46908	32835	1262535,96	2395661,53	192832,60	9936,55	2313,99	90059,13	53101,56	75061,79	2,98502E-07	5,13	57227,19	1584432,23	564691,65	128655,90	860284,16	0,00	7276799,37
2029	48315	33820	1300412,04	2467531,38	198617,58	10234,65	2383,41	92760,90	54694,61	77313,65	3,07458E-07	5,28	58944,01	1631965,20	581632,40	132515,57	886092,68	0,00	7495103,35
2030	49764	34835	1339424,40	2541557,32	204576,11	10541,69	2454,91	95543,73	56335,45	79633,06	3,16681E-07	5,44	60712,33	1680924,15	744313,22	136491,04	912675,46	0,00	7865188,30
2031	51257	35880	1379607,13	2617804,04	210713,39	10857,94	2528,56	98410,04	58025,51	82022,05	3,26182E-07	5,60	62533,70	1731351,88	766642,61	140585,77	940055,73	0,00	8101143,95
2032	52795	36956	1420995,34	2696338,16	217034,80	11183,68	2604,42	101362,34	59766,28	84482,71	3,35967E-07	5,77	64409,71	1783292,44	789641,89	144803,35	968257,40	0,00	8344178,27
2033	54379	38065	1463625,20	2777228,31	223545,84	11519,19	2682,55	104403,21	61559,26	87017,19	3,46046E-07	5,94	66342,00	1836791,21	813331,15	149147,45	997305,12	0,00	8594503,62
2034	56010	39207	1507533,96	2860545,16	230252,21	11864,76	2763,03	107535,31	63406,04	89627,71	3,56428E-07	6,12	68332,26	1891894,95	837731,08	153621,87	1027224,28	0,00	8852338,73
2035	57690	40383	1552759,98	2946361,51	237159,78	12220,70	2845,92	110761,37	65308,22	92316,54	3,6712E-07	6,31	70382,23	1948651,79	862863,01	158230,53	1058041,00	0,00	9117908,89
2036	59421	41595	1599342,78	3034752,36	244274,57	12587,33	2931,29	114084,21	67267,47	95086,03	3,78134E-07	6,50	72493,69	2007111,35	888748,90	162977,44	1089782,23	0,00	9391446,16
2037	61204	42843	1647323,06	3125794,93	251602,81	12964,94	3019,23	117506,74	69285,49	97938,61	3,89478E-07	6,69	74668,50	2067324,69	915411,37	167866,76	1122475,70	0,00	9673189,54

2038	63040	44128	1696742,75	3219568,78	259150,90	13353,89	3109,81	121031,94	71364,06	100876,77	4,01162E-07	6,89	76908,56	2129344,43	942873,71	172902,77	1156149,97	0,00	9963385,23
2039	64931	45452	1747645,03	3316155,84	266925,42	13754,51	3203,11	124662,90	73504,98	103903,08	4,13197E-07	7,10	79215,82	2193224,76	971159,92	178089,85	1190834,47	0,00	10262286,78
2040	66879	46815	1800074,39	3415640,51	274933,19	14167,15	3299,20	128402,78	75710,13	107020,17	4,25593E-07	7,31	81592,29	2259021,50	1000294,72	183432,55	1226559,50	0,00	10570155,39

BCN YEAR	TOTAL PASSENGERS	PYRENEES PASSENGERS (70%)	Road Travel Time COST (€)	Air Travel Time COST (€)	Heavy Vehicles Functioning COST (€)	Bus Pollution COST (€)	Bus Noise COST (€)	Passengers' Aircraft Noise COST (€)	Bus Driver COST (€)	Bus Fuel COST (€)	Number of Bus Accidents	Bus Accidents COST (€)	Pilot COST (€)	Aircraft Fuel COST (€)	Aircraft Pollution COST (€)	Aircraft Noise COST (€)	Aircraft Functioning COST (€)	Use of Land COST (€)	TOTAL TRANSPORT COST / YEAR (€)
2010	61769	43238	1569613,42	2957499,72	264618,40	13635,63	3175,42	111180,08	66017,07	103005,05	1,19114E-07	2,48	70648,29	1956018,33	591499,94	158828,69	1068603,70	0,00	8934346,22
2011	33000	23100	838563,73	1580040,00	141372,00	7284,82	1696,46	59397,80	35269,53	55030,30	6,36364E-08	1,32	37743,75	1045000,00	316008,00	84854,00	570900,00	0,00	4773161,70
2012	33041	23129	839605,58	1582003,08	141547,64	7293,87	1698,57	59471,60	35313,34	55098,67	6,37154E-08	1,32	37790,64	1046298,33	316400,62	84959,42	571609,30	0,00	4779091,99
2013	29443	20610	748176,72	1409730,84	126133,81	6499,60	1513,61	52995,44	31467,90	49098,70	5,67771E-08	1,18	33675,43	932361,67	281946,17	75707,77	509363,90	0,00	4258672,73
2014	30400	21280	772495,07	1455552,00	130233,60	6710,86	1562,80	54717,97	32490,71	50694,58	5,86226E-08	1,22	34770,00	962666,67	291110,40	78168,53	525920,00	0,00	4397094,42
2015	30200	21140	767412,86	1445976,00	129376,80	6666,71	1552,52	54357,99	32276,96	50361,06	5,82369E-08	1,21	34541,25	956333,33	289195,20	77654,27	522460,00	0,00	4368166,16
2016	32900	23030	836022,62	1575252,00	140943,60	7262,74	1691,32	59217,81	35162,65	54863,54	6,34435E-08	1,32	37629,38	1041833,33	315050,40	84596,87	569170,00	0,00	4758697,58
2017	33887	23721	861103,30	1622509,56	145171,91	7480,62	1742,06	60994,34	36217,53	56509,45	6,53468E-08	1,36	38758,26	1073088,33	324501,91	87134,77	586245,10	0,00	4901458,50
2018	34904	24433	886936,40	1671184,85	149527,07	7705,04	1794,32	62824,17	37304,05	58204,73	6,73072E-08	1,40	39921,00	1105280,98	334236,97	89748,82	603832,45	0,00	5048502,26
2019	35951	25166	913544,49	1721320,39	154012,88	7936,19	1848,15	64708,90	38423,17	59950,87	6,93265E-08	1,44	41118,63	1138439,41	344264,08	92441,28	621947,43	0,00	5199957,33
2020	37029	25920	940950,83	1772960,00	158633,26	8174,28	1903,60	66650,16	39575,87	61749,40	7,14062E-08	1,48	42352,19	1172592,60	417912,00	95214,52	640605,85	0,00	5419276,05
2021	38140	26698	969179,35	1826148,80	163392,26	8419,51	1960,71	68649,67	40763,15	63601,88	7,35484E-08	1,53	43622,76	1207770,37	430449,36	98070,95	659824,02	0,00	5581854,33
2022	39284	27499	998254,73	1880933,27	168294,03	8672,09	2019,53	70709,16	41986,04	65509,94	7,57549E-08	1,57	44931,44	1244003,48	443362,84	101013,08	679618,75	0,00	5749309,96
2023	40463	28324	1028202,38	1937361,27	173342,85	8932,26	2080,11	72830,43	43245,62	67475,23	7,80275E-08	1,62	46279,38	1281323,59	456663,73	104043,48	700007,31	0,00	5921789,26
2024	41677	29174	1059048,45	1995482,10	178543,14	9200,22	2142,52	75015,35	44542,99	69499,49	8,03684E-08	1,67	47667,77	1319763,30	470363,64	107164,78	721007,53	0,00	6099442,93
2025	42927	30049	1090819,90	2055346,57	183899,43	9476,23	2206,79	77265,81	45879,28	71584,48	8,27794E-08	1,72	49097,80	1359356,20	484474,55	110379,72	742637,75	0,00	6282426,22
2026	44215	30950	1123544,50	2117006,96	189416,41	9760,52	2273,00	79583,78	47255,66	73732,01	8,52628E-08	1,77	50570,73	1400136,88	499008,78	113691,11	764916,89	0,00	6470899,01
2027	45541	31879	1157250,83	2180517,17	195098,90	10053,33	2341,19	81971,29	48673,33	75943,97	8,78207E-08	1,83	52087,86	1442140,99	513979,05	117101,85	787864,39	0,00	6665025,98
2028	46908	32835	1191968,36	2245932,69	200951,87	10354,93	2411,42	84430,43	50133,53	78222,29	9,04553E-08	1,88	53650,49	1485405,22	529398,42	120614,90	811500,32	0,00	6864976,76
2029	48315	33820	1227727,41	2313310,67	206980,43	10665,58	2483,77	86963,35	51637,53	80568,96	9,3169E-08	1,94	55260,01	1529967,37	545280,37	124233,35	835845,33	0,00	7070926,06
2030	49764	34835	1264559,23	2382709,99	213189,84	10985,55	2558,28	89572,25	53186,66	82986,03	9,5964E-08	1,99	56917,81	1575866,40	697793,64	127960,35	860920,69	0,00	7419208,70
2031	51257	35880	1302496,01	2454191,29	219585,54	11315,11	2635,03	92259,41	54782,26	85475,61	9,88429E-08	2,05	58625,34	1623142,39	718727,45	131799,16	886748,31	0,00	7641784,96
2032	52795	36956	1341570,89	2527817,03	226173,10	11654,57	2714,08	95027,20	56425,73	88039,88	1,01808E-07	2,12	60384,10	1671836,66	740289,27	135753,14	913350,76	0,00	7871038,51
2033	54379	38065	1381818,01	2603651,54	232958,30	12004,20	2795,50	97878,01	58118,50	90681,07	1,04862E-07	2,18	62195,62	1721991,76	762497,95	139825,73	940751,29	0,00	8107169,66
2034	56010	39207	1423272,55	2681761,08	239947,04	12364,33	2879,36	100814,35	59862,05	93401,50	1,08008E-07	2,24	64061,49	1773651,51	785372,89	144020,50	968973,83	0,00	8350384,75
2035	57690	40383	1465970,73	2762213,92	247145,46	12735,26	2965,75	103838,78	61657,92	96203,55	1,11249E-07	2,31	65983,34	1826861,06	808934,08	148341,12	998043,04	0,00	8600896,30
2036	59421	41595	1509949,85	2845080,33	254559,82	13117,32	3054,72	106953,95	63507,65	99089,66	1,14586E-07	2,38	67962,84	1881666,89	833202,10	152791,35	1027984,33	0,00	8858923,19
2037	61204	42843	1555248,35	2930432,74	262196,61	13510,84	3146,36	110162,56	65412,88	102062,35	1,18024E-07	2,45	70001,72	1938116,89	858198,16	157375,09	1058823,86	0,00	9124690,88
2038	63040	44128	1601905,80	3018345,73	270062,51	13916,16	3240,75	113467,44	67375,27	105124,22	1,21564E-07	2,53	72101,77	1996260,40	883944,11	162096,34	1090588,58	0,00	9398431,61
2039	64931	45452	1649962,97	3108896,10	278164,39	14333,65	3337,97	116871,46	69396,53	108277,94	1,25211E-07	2,60	74264,83	2056148,21	910462,43	166959,23	1123306,23	0,00	9680384,56
2040	66879	46815	1699461,86	3202162,98	286509,32	14763,66	3438,11	120377,61	71478,42	111526,28	1,28968E-07	2,68	76492,77	2117832,66	937776,30	171968,01	1157005,42	0,00	9970796,09

TOULOUSE YEAR	TOTAL PASSENGERS	PYRENEES PASSENGERS (70%)	Road Travel Time COST (€)	Air Travel Time COST (€)	Heavy Vehicles Functioning COST (€)	Bus Pollution COST (€)	Bus Noise COST (€)	Passengers' Aircraft Noise COST (€)	Bus Driver COST (€)	Bus Fuel COST (€)	Number of Bus Accidents	Bus Accidents COST (€)	Pilot COST (€)	Aircraft Fuel COST (€)	Aircraft Pollution COST (€)	Aircraft Noise COST (€)	Aircraft Functioning COST (€)	Use of Land COST (€)	TOTAL TRANSPORT COST / YEAR (€)
2010	61769	43238	1662527,04	2168818,08	257934,32	13291,20	3095,21	81531,49	69924,97	100403,21	1,22199E-07	2,54	51808,75	1434413,44	433766,63	116474,37	812880,04	0,00	7206871,30
2011	33000	23100	888208,86	1158696,00	137802,00	7100,86	1653,62	43558,39	37357,57	53640,64	6,5285E-08	1,36	27678,75	766333,33	231739,20	62226,27	434280	0,00	3850276,85
2012	33041	23129	889323,93	1160150,64	137975,00	7109,77	1655,70	43613,07	37404,47	53707,99	6,53669E-08	1,36	27713,14	767285,44	232027,12	62303,58	434819,56	0,00	3855090,76
2013	29443	20610	792466,87	1033797,60	122948,02	6335,44	1475,38	38863,13	33330,72	47858,60	5,82478E-08	1,21	24695,32	683731,89	206760,52	55519,03	387469,88	0,00	3435253,60
2014	30400	21280	818228,77	1067404,80	126944,87	6541,39	1523,34	40126,51	34414,25	49414,41	6,01413E-08	1,25	25498,00	705955,56	213480,96	57323,59	400064	0,00	3546921,70
2015	30200	21140	812845,68	1060382,40	126109,71	6498,36	1513,32	39862,52	34187,84	49089,32	5,97456E-08	1,24	25330,25	701311,11	212076,48	56946,46	397432	0,00	3523586,69
2016	32900	23030	885517,32	1155184,80	137384,42	7079,34	1648,61	43426,39	37244,37	53478,10	6,50871E-08	1,35	27594,88	764011,11	231036,96	62037,70	432964	0,00	3838609,34
2017	33887	23721	912086,68	1189845,36	141506,55	7291,75	1698,08	44729,37	38361,86	55082,67	6,704E-08	1,39	28422,72	786931,44	237968,07	63898,83	445952,92	0,00	3953777,70
2018	34904	24433	939463,51	1225559,28	145753,95	7510,62	1749,05	46071,95	39513,31	56736,01	6,90523E-08	1,44	29275,73	810548,44	245109,85	65816,53	459336,64	0,00	4072446,31
2019	35951	25166	967647,80	1262326,56	150126,63	7735,94	1801,52	47454,13	40698,73	58438,12	7,11239E-08	1,48	30153,90	834862,11	252462,30	67790,80	473115,16	0,00	4194615,17
2020	37029	25920	996639,55	1300147,20	154624,58	7967,71	1855,49	48875,90	41918,11	60188,98	7,32548E-08	1,52	31058,07	859895,67	306466,82	69823,53	487301,64	0,00	4366764,78
2021	38140	26698	1026554,12	1339171,68	159265,71	8206,87	1911,19	50342,94	43176,30	61995,58	7,54536E-08	1,57	31989,93	885695,56	315661,90	71918,48	501922,4	0,00	4497814,20
2022	39284	27499	1057353,05	1379349,84	164044,03	8453,09	1968,53	51853,34	44471,68	63855,59	7,77174E-08	1,62	32949,46	912261,78	325130,10	74075,66	516977,44	0,00	4632745,19
2023	40463	28324	1089074,79	1420731,84	168965,53	8706,69	2027,59	53408,99	45805,88	65771,33	8,0049E-08	1,66	33938,34	939640,78	334887,97	76298,83	532493,08	0,00	4771753,32
2024	41677	29174	1121757,80	1463367,84	174036,17	8967,98	2088,43	55011,79	47180,51	67745,12	8,24512E-08	1,71	34956,58	967832,56	344935,52	78588,00	548469,32	0,00	4914939,35
2025	42927	30049	1155402,08	1507257,84	179255,94	9236,95	2151,07	56661,73	48595,57	69776,96	8,49242E-08	1,77	36005,02	996860,33	355281,02	80945,06	564919,32	0,00	5062350,67
2026	44215	30950	1190046,07	1552452,00	184630,82	9513,92	2215,57	58360,70	50052,68	71869,18	8,74706E-08	1,82	37085,33	1026770,56	365941,03	83373,77	581869,4	0,00	5214182,82
2027	45541	31879	1225766,68	1599050,64	190172,73	9799,49	2282,07	60112,46	51555,07	74026,41	9,00961E-08	1,87	38197,51	1057563,22	376915,53	85874,13	599319,56	0,00	5370637,38
2028	46908	32835	1262525,45	1647003,60	195875,70	10093,36	2350,51	61915,14	53101,12	76246,34	9,27979E-08	1,93	39344,09	1089308,00	388229,37	88451,81	617309,28	0,00	5531755,69
2029	48315	33820	1300399,29	1696411,20	201751,67	10396,15	2421,02	63772,50	54694,07	78533,62	9,55817E-08	1,99	40524,21	1121981,67	399874,27	91104,91	635825,4	0,00	5697691,95
2030	49764	34835	1339426,65	1747323,60	207806,61	10708,15	2493,68	65686,42	56335,54	80890,56	9,84503E-08	2,05	41739,56	1155630,67	511713,26	93837,21	654894,24	0,00	5968488,19
2031	51257	35880	1379607,53	1799740,80	214040,51	11029,38	2568,49	67656,92	58025,53	83317,16	1,01404E-07	2,11	42991,81	1190301,44	527065,48	96652,48	674542,12	0,00	6147541,75
2032	52795	36956	1420980,37	1853712,96	220459,34	11360,14	2645,51	69685,88	59765,65	85815,74	1,04445E-07	2,17	44281,81	1226017,22	542880,43	99552,60	694782,2	0,00	6331942,01
2033	54379	38065	1463622,09	1909340,40	227075,03	11701,04	2724,90	71777,06	61559,13	88390,96	1,07579E-07	2,24	45610,39	1262801,22	559168,38	102539,46	715627,64	0,00	6521939,93
2034	56010	39207	1507532,67	1966623,12	233887,58	12052,09	2806,65	73930,46	63405,99	91042,80	1,10806E-07	2,30	46978,39	1300676,67	575939,63	105614,95	737091,6	0,00	6717584,89
2035	57690	40383	1552750,58	2025611,28	240902,95	12413,59	2890,84	76147,98	65307,83	93773,60	1,1413E-07	2,37	48387,49	1339690,00	593214,73	108782,83	759200,4	0,00	6919076,46
2036	59421	41595	1599352,71	2086405,20	248133,08	12786,15	2977,60	78433,38	67267,89	96587,99	1,17555E-07	2,44	49839,36	1379887,67	611014,26	112046,88	781980,36	0,00	7126714,97
2037	61204	42843	1647339,06	2149004,88	255577,97	13169,78	3066,94	80786,66	69286,17	99485,98	1,21082E-07	2,52	51334,86	1421292,89	629348,49	115408,98	805444,64	0,00	7340549,81
2038	63040	44128	1696748,08	2213460,48	263243,58	13564,79	3158,92	83209,72	71364,28	102469,89	1,24714E-07	2,59	52874,80	1463928,89	648227,71	118871,03	829606,4	0,00	7560731,15
2039	64931	45452	1747656,67	2279872,32	271141,84	13971,78	3253,70	85706,31	73505,47	105544,35	1,28456E-07	2,67	54460,88	1507842,11	667672,49	122436,78	854491,96	0,00	7787559,33
2040	66879	46815	1800064,84	2348240,40	279272,75	14390,76	3351,27	88276,44	75709,73	108709,38	1,32308E-07	2,75	56094,76	1553079,00	687703,38	126110,01	880127,64	0,00	8021133,13

ANNEX 4: CBA

LLEIDA-GIRONA

YEAR	RoadT.Time(€)	AirT.T(€)	HeavyVehi Funct(€)	Bus.Poll(€)	Bus.Noise(€)	Pass.Air.Noise(€)	B.Driv.(€)	B.Fuel(€)	Num.B.Acc.	B.Accid.(€)	Pilot(€)	Airc.Fuel(€)	Airc.Poll.(€)	Aircr.N.(€)	Aircr.Func(€)	Land(€)	CBA(€)/YEAR	BorC/ Year (€)	OtherCashFlow(€)	C.Flow/Year (€)
2010	-208607,50	197166,65	-53458,26	-2754,67	-641,50	7412,01	-8773,92	-20809,10	3,51198E-07	5,61	4709,89	130401,22	39433,33	10588,58	64239,76	727027,00	885939,08	-885939,08	-90000000,00	-90885939,08
2011	-111448,26	105336,00	-28560,00	-1471,68	-342,72	3959,85	-4687,45	-11117,23	1,87627E-07	2,99	2516,25	69666,67	21067,20	5656,93	34320,00	727027,00	811925,55	-811925,55	-78700,00	-890625,55
2012	-111586,73	105466,87	-28595,48	-1473,51	-343,15	3964,77	-4693,28	-11131,04	1,8786E-07	3,00	2519,38	69753,22	21093,37	5663,96	34362,64	727027,00	812031,03	-812031,03	-78700,00	-890731,03
2013	-99435,49	93982,06	-25481,58	-1313,05	-305,78	3533,03	-4182,20	-9918,93	1,67403E-07	2,67	2245,03	62157,44	18796,41	5047,18	30620,72	727027,00	802774,52	-802774,52	-78700,00	-881474,52
2014	-102667,49	97036,80	-26309,82	-1355,73	-315,72	3647,86	-4318,14	-10241,33	1,72844E-07	2,76	2318,00	64177,78	19407,36	5211,24	31616,00	727027,00	805236,58	-805236,58	-78700,00	-883936,58
2015	-101992,04	96398,40	-26136,73	-1346,81	-313,64	3623,87	-4289,73	-10173,95	1,71707E-07	2,74	2302,75	63755,56	19279,68	5176,95	31408,00	727027,00	804722,04	-804722,04	-78700,00	-883422,04
2016	-111110,54	105016,80	-28473,45	-1467,22	-341,68	3947,85	-4673,25	-11083,54	1,87058E-07	2,99	2508,63	69455,56	21003,36	5639,79	34216,00	727027,00	811668,29	-811668,29	-78700,00	-890368,29
2017	-114443,85	108167,30	-29327,66	-1511,24	-351,93	4066,29	-4813,45	-11416,05	1,9267E-07	3,08	2583,88	71539,22	21633,46	5808,98	35242,48	727027,00	814207,52	-814207,52	-78700,00	-892907,52
2018	-117877,17	111412,32	-30207,49	-1556,57	-362,49	4188,28	-4957,85	-11758,53	1,9845E-07	3,17	2661,40	73685,40	22282,46	5983,25	36299,75	727027,00	816822,94	-816822,94	-78700,00	-895522,94
2019	-121413,48	114754,69	-31113,71	-1603,27	-373,36	4313,93	-5106,58	-12111,29	2,04404E-07	3,26	2741,24	75895,96	22950,94	6162,75	37388,75	727027,00	819516,82	-819516,82	-78700,00	-898216,82
2020	-125055,89	118197,33	-32047,12	-1651,37	-384,57	4443,34	-5259,78	-12474,63	2,10536E-07	3,36	2823,48	78172,84	27860,80	6347,63	38510,41	727027,00	826512,85	-826512,85	-78700,00	-905212,85
2021	-128807,57	121743,25	-33008,54	-1700,91	-396,10	4576,64	-5417,57	-12848,86	2,16852E-07	3,46	2908,18	80518,02	28696,62	6538,06	39665,72	727027,00	829497,42	-829497,42	-78700,00	-908197,42
2022	-132671,79	125395,55	-33998,79	-1751,94	-407,99	4713,94	-5580,10	-13234,33	2,23357E-07	3,57	2995,43	82933,57	29557,52	6734,21	40855,69	727027,00	832571,53	-832571,53	-78700,00	-911271,53
2023	-136651,95	129157,42	-35018,76	-1804,50	-420,23	4855,36	-5747,51	-13631,36	2,30058E-07	3,67	3085,29	85421,57	30444,25	6936,23	42081,36	727027,00	835737,87	-835737,87	-78700,00	-914437,87
2024	-140751,51	133032,14	-36069,32	-1858,63	-432,83	5001,02	-5919,93	-14040,30	2,3696E-07	3,78	3177,85	87984,22	31357,58	7144,32	43343,81	727027,00	838999,20	-838999,20	-78700,00	-917699,20
2025	-144974,05	137023,10	-37151,40	-1914,39	-445,82	5151,05	-6097,53	-14461,51	2,44069E-07	3,90	3273,19	90623,75	32298,30	7358,65	44644,12	727027,00	842358,36	-842358,36	-78700,00	-921058,36
2026	-149323,27	141133,80	-38265,94	-1971,82	-459,19	5305,59	-6280,45	-14895,36	2,51391E-07	4,01	3371,38	93342,46	33267,25	7579,41	45983,44	727027,00	845818,30	-845818,30	-78700,00	-924518,30
2027	-153802,97	145367,81	-39413,92	-2030,98	-472,97	5464,75	-6468,87	-15342,22	2,58932E-07	4,13	3472,52	96142,73	34265,27	7806,79	47362,95	727027,00	849382,04	-849382,04	-78700,00	-928082,04
2028	-158417,06	149728,85	-40596,34	-2091,91	-487,16	5628,70	-6662,93	-15802,48	2,667E-07	4,26	3576,70	99027,01	35293,23	8040,99	48783,83	727027,00	853052,69	-853052,69	-78700,00	-931752,69
2029	-163169,57	154220,71	-41814,23	-2154,66	-501,77	5797,56	-6862,82	-16276,56	2,74701E-07	4,38	3684,00	101997,82	36352,02	8282,22	50247,35	727027,00	856833,46	-856833,46	-78700,00	-935533,46
2030	-168064,66	158847,33	-43068,65	-2219,30	-516,82	5971,48	-7068,71	-16764,85	2,82942E-07	4,52	3794,52	105057,76	46519,58	8530,69	51754,77	727027,00	869804,65	-869804,65	-78700,00	-948504,65
2031	-173106,60	163612,75	-44360,71	-2285,88	-532,33	6150,63	-7280,77	-17267,80	2,91431E-07	4,65	3908,36	108209,49	47915,16	8786,61	53307,41	727027,00	874087,98	-874087,98	-78700,00	-952787,98
2032	-178299,80	168521,14	-45691,54	-2354,46	-548,30	6335,15	-7499,19	-17785,83	3,00174E-07	4,79	4025,61	111455,78	49352,62	9050,21	54906,64	727027,00	878499,81	-878499,81	-78700,00	-957199,81
2033	-183648,79	173576,77	-47062,28	-2425,09	-564,75	6525,20	-7724,17	-18319,41	3,09179E-07	4,94	4146,37	114799,45	50833,20	9321,72	56553,83	727027,00	883043,99	-883043,99	-78700,00	-961743,99
2034	-189158,25	178784,07	-48474,15	-2497,84	-581,69	6720,96	-7955,89	-18868,99	3,18454E-07	5,08	4270,77	118243,43	52358,19	9601,37	58250,45	727027,00	887724,50	-887724,50	-78700,00	-966424,50
2035	-194833,00	184147,59	-49928,37	-2572,78	-599,14	6922,59	-8194,57	-19435,06	3,28008E-07	5,24	4398,89	121790,74	53928,94	9889,41	59997,96	727027,00	892545,43	-892545,43	-78700,00	-971245,43
2036	-200677,99	189672,02	-51426,23	-2649,96	-617,11	7130,26	-8440,40	-20018,11	3,37848E-07	5,39	4530,86	125444,46	55546,81	10186,09	61797,90	727027,00	897510,98	-897510,98	-78700,00	-976210,98
2037	-206698,33	195362,18	-52969,01	-2729,46	-635,63	7344,17	-8693,62	-20618,66	3,47983E-07	5,55	4666,78	129207,79	57213,21	10491,67	63651,84	727027,00	902625,50	-902625,50	-78700,00	-981325,50
2038	-212899,28	201223,05	-54558,08	-2811,35	-654,70	7564,50	-8954,43	-21237,22	3,58423E-07	5,72	4806,78	133084,03	58929,61	10806,42	65561,39	727027,00	907893,45	-907893,45	-78700,00	-986593,45
2039	-219286,26	207259,74	-56194,83	-2895,69	-674,34	7791,43	-9223,06	-21874,33	3,69176E-07	5,89	4950,99	137076,55	60697,50	11130,62	67528,24	727027,00	913319,45	-913319,45	-78700,00	-992019,45
2040	-225864,85	213477,53	-57880,67	-2982,56	-694,57	8025,17	-9499,75	-22530,56	3,80251E-07	6,07	5099,52	141188,84	62518,42	11464,53	69554,08	727027,00	918908,22	-918908,22	36000000,00	35081091,78

LLEIDA-REUS

YEAR	RoadT.Time(€)	AirT.T(€)	HeavyVehiFunct(€)	Bus.Poll(€)	Bus.Noise(€)	Pass.Air.Noise(€)	B.Driv.(€)	B.Fuel(€)	Num.B.Acc.	B.Accid.(€)	Pilot(€)	Airc.Fuel(€)	Airc.Poll.(€)	Aircr.N.(€)	Aircr.Func(€)	Land(€)	CBA(€)/YEAR	BorC/ Year (€)	OtherCashFlow(€)	C.Flow/Year (€)
2010	-271821,90	-394333,30	-41430,15	-2134,87	-497,16	-14824,01	-11432,68	-16127,05	7,66374E-08	1,32	-9419,77	-260802,44	-78866,66	-21177,16	-127244,14	727027,00	-523082,98	523082,98	-90000000,00	-89476917,02
2011	-145220,46	-210672,00	-22134,00	-1140,55	-265,61	-7919,71	-6107,89	-8615,85	4,09434E-08	0,70	-5032,50	-139333,33	-42134,40	-11313,87	-67980,00	727027,00	59157,53	-59157,53	-78700,00	-137857,53
2012	-145400,89	-210933,74	-22161,50	-1141,97	-265,94	-7929,55	-6115,48	-8626,56	4,09943E-08	0,70	-5038,75	-139506,44	-42186,75	-11327,92	-68064,46	727027,00	58327,75	-58327,75	-78700,00	-137027,75
2013	-129567,45	-187964,11	-19748,22	-1017,61	-236,98	-7066,06	-5449,54	-7687,17	3,65302E-08	0,63	-4490,06	-124314,89	-37592,82	-10094,37	-60652,58	727027,00	131145,76	-131145,76	-78700,00	-209845,76
2014	-133778,85	-194073,60	-20390,11	-1050,69	-244,68	-7295,73	-5626,66	-7937,03	3,77176E-08	0,65	-4636,00	-128355,56	-38814,72	-10422,47	-62624,00	727027,00	111777,55	-111777,55	-78700,00	-190477,55
2015	-132898,72	-192796,80	-20255,96	-1043,78	-243,07	-7247,73	-5589,65	-7884,81	3,74694E-08	0,64	-4605,50	-127511,11	-38559,36	-10353,90	-62212,00	727027,00	115825,24	-115825,24	-78700,00	-194525,24
2016	-144780,40	-210033,60	-22066,93	-1137,10	-264,80	-7895,71	-6089,38	-8589,75	4,08193E-08	0,70	-5017,25	-138911,11	-42006,72	-11279,58	-67774,00	727027,00	61181,38	-61181,38	-78700,00	-139881,38
2017	-149123,81	-216334,61	-22728,94	-1171,21	-272,75	-8132,58	-6272,06	-8847,44	4,20439E-08	0,72	-5167,77	-143078,44	-43266,92	-11617,97	-69807,22	727027,00	41206,01	-41206,01	-78700,00	-119906,01
2018	-153597,52	-222824,65	-23410,80	-1206,34	-280,93	-8376,56	-6460,23	-9112,86	4,33052E-08	0,74	-5322,80	-147370,80	-44564,93	-11966,51	-71901,44	727027,00	20631,38	-20631,38	-78700,00	-99331,38
2019	-158205,45	-229509,39	-24113,13	-1242,54	-289,36	-8627,85	-6654,03	-9386,25	4,46044E-08	0,77	-5482,48	-151791,92	-45901,88	-12325,50	-74058,48	727027,00	-560,49	560,49	-78700,00	-78139,51
2020	-162951,61	-236394,67	-24836,52	-1279,81	-298,04	-8886,69	-6853,65	-9667,83	4,59425E-08	0,79	-5646,96	-156345,68	-55721,60	-12695,27	-76280,23	727027,00	-30830,78	30830,78	-78700,00	-47869,22
2021	-167840,16	-243486,51	-25581,62	-1318,21	-306,98	-9153,29	-7059,26	-9957,87	4,73208E-08	0,81	-5816,37	-161036,05	-57393,25	-13076,13	-78568,64	727027,00	-53566,52	53566,52	-78700,00	-25133,48
2022	-172875,37	-250791,10	-26349,07	-1357,75	-316,19	-9427,89	-7271,04	-10256,61	4,87404E-08	0,84	-5990,86	-165867,13	-59115,05	-13468,41	-80925,70	727027,00	-76984,32	76984,32	-78700,00	-1715,68
2023	-178061,63	-258314,84	-27139,54	-1398,48	-325,67	-9710,72	-7489,17	-10564,30	5,02026E-08	0,86	-6170,58	-170843,15	-60888,50	-13872,46	-83353,47	727027,00	-101104,66	101104,66	-78700,00	22404,66
2024	-183403,48	-266064,28	-27953,72	-1440,44	-335,44	-10002,05	-7713,85	-10881,23	5,17087E-08	0,89	-6355,70	-175968,44	-62715,15	-14288,64	-85854,08	727027,00	-125948,61	125948,61	-78700,00	47248,61
2025	-188905,58	-274046,21	-28792,33	-1483,65	-345,51	-10302,11	-7945,26	-11207,67	5,326E-08	0,91	-6546,37	-181247,49	-64596,61	-14717,30	-88429,70	727027,00	-151537,88	151537,88	-78700,00	72837,88
2026	-194572,75	-282267,60	-29656,11	-1528,16	-355,87	-10611,17	-8183,62	-11543,90	5,48578E-08	0,94	-6742,76	-186684,92	-66534,50	-15158,82	-91082,59	727027,00	-177894,82	177894,82	-78700,00	99194,82
2027	-200409,93	-290735,62	-30545,79	-1574,01	-366,55	-10929,51	-8429,13	-11890,22	5,65035E-08	0,97	-6945,05	-192285,47	-68530,54	-15613,58	-93815,07	727027,00	-205042,48	205042,48	-78700,00	126342,48
2028	-206422,23	-299457,69	-31462,16	-1621,23	-377,55	-11257,39	-8682,00	-12246,92	5,81986E-08	1,00	-7153,40	-198054,03	-70586,46	-16081,99	-96629,52	727027,00	-233004,56	233004,56	-78700,00	154304,56
2029	-212614,90	-308441,42	-32406,03	-1669,86	-388,87	-11595,11	-8942,46	-12614,33	5,99446E-08	1,03	-7368,00	-203995,65	-72704,05	-16564,45	-99528,40	727027,00	-261805,51	261805,51	-78700,00	183105,51
2030	-218993,34	-317694,67	-33378,21	-1719,96	-400,54	-11942,97	-9210,74	-12992,76	6,17429E-08	1,06	-7589,04	-210115,52	-93039,15	-17061,38	-102514,26	727027,00	-309624,47	309624,47	-78700,00	230924,47
2031	-225563,14	-327225,51	-34379,55	-1771,56	-412,55	-12301,26	-9487,06	-13382,54	6,35952E-08	1,09	-7816,71	-216418,98	-95830,33	-17573,22	-105589,68	727027,00	-340724,01	340724,01	-78700,00	262024,01
2032	-232330,04	-337042,27	-35410,94	-1824,70	-424,93	-12670,29	-9771,67	-13784,02	6,5503E-08	1,13	-8051,21	-222911,55	-98705,24	-18100,42	-108757,37	727027,00	-372756,54	372756,54	-78700,00	294056,54
2033	-239299,94	-347153,54	-36473,27	-1879,45	-437,68	-13050,40	-10064,82	-14197,54	6,74681E-08	1,16	-8292,75	-229598,90	-101666,39	-18643,43	-112020,10	727027,00	-405750,05	405750,05	-78700,00	327050,05
2034	-246478,94	-357568,14	-37567,47	-1935,83	-450,81	-13441,91	-10366,77	-14623,47	6,94922E-08	1,19	-8541,53	-236486,87	-104716,39	-19202,73	-115380,70	727027,00	-439733,36	439733,36	-78700,00	361033,36
2035	-253873,30	-368295,19	-38694,49	-1993,90	-464,33	-13845,17	-10677,77	-15062,17	7,15769E-08	1,23	-8797,78	-243581,47	-107857,88	-19778,82	-118842,12	727027,00	-474736,17	474736,17	-78700,00	396036,17
2036	-261489,50	-379344,04	-39855,33	-2053,72	-478,26	-14260,53	-10998,10	-15514,04	7,37242E-08	1,27	-9061,71	-250888,92	-111093,61	-20372,18	-122407,38	727027,00	-510789,06	510789,06	-78700,00	432089,06
2037	-269334,19	-390724,37	-41050,99	-2115,33	-492,61	-14688,34	-11328,05	-15979,46	7,5936E-08	1,30	-9333,56	-258415,59	-114426,42	-20983,35	-126079,60	727027,00	-547923,55	547923,55	-78700,00	469223,55
2038	-277414,21	-402446,10	-42282,51	-2178,79	-507,39	-15128,99	-11667,89	-16458,84	7,8214E-08	1,34	-9613,57	-266168,05	-117859,21	-21612,85	-129861,99	727027,00	-586172,06	586172,06	-78700,00	507472,06
2039	-285736,64	-414519,48	-43550,99	-2244,16	-522,61	-15582,86	-12017,92	-16952,61	8,05605E-08	1,38	-9901,98	-274153,10	-121394,99	-22261,23	-133757,85	727027,00	-625568,04	625568,04	-78700,00	546868,04
2040	-294308,74	-426955,06	-44857,52	-2311,48	-538,29	-16050,35	-12378,46	-17461,19	8,29773E-08	1,43	-10199,04	-282377,69	-125036,84	-22929,07	-137770,59	727027,00	-666145,89	666145,89	36000000,00	36666145,89

LLEIDA - BCN

YEAR	RoadT.Time(€)	AirT.T(€)	HeavyVehiFunct(€)	Bus.Poll(€)	Bus.Noise(€)	Pass.Air.Noise(€)	B.Driv.(€)	B.Fuel(€)	Num.B.Acc.	B.Accid.(€)	Pilot(€)	Airc.Fuel(€)	Airc.Poll.(€)	Aircr.N.(€)	Aircr.Func(€)	Land(€)	CBA(€)/YEAR	BorC/ Year(€)	OtherCashFlow(€)	C.Flow/Year (€)
2010	-178896,74	-197166,65	-52121,81	-2685,81	-625,46	-7412,01	-7524,30	-20288,87	3,50599E-07	5,59	-4709,89	-130401,22	-39433,33	-10588,58	-63004,38	727027,00	12173,56	-12173,56	-90000000,00	-90012173,56
2011	-95575,33	-105336,00	-27846,00	-1434,89	-334,15	-3959,85	-4019,85	-10839,30	1,87307E-07	2,99	-2516,25	-69666,67	-21067,20	-5656,93	-33660,00	727027,00	345117,57	-345117,57	-78700,00	-423817,57
2012	-95694,07	-105466,87	-27880,60	-1436,67	-334,57	-3964,77	-4024,84	-10852,77	1,8754E-07	2,99	-2519,38	-69753,22	-21093,37	-5663,96	-33701,82	727027,00	344643,08	-344643,08	-78700,00	-423343,08
2013	-85273,46	-93982,06	-24844,54	-1280,22	-298,13	-3533,03	-3586,55	-9670,96	1,67118E-07	2,67	-2245,03	-62157,44	-18796,41	-5047,18	-30031,86	727027,00	386282,78	-386282,78	-78700,00	-464982,78
2014	-88045,15	-97036,80	-25652,07	-1321,84	-307,82	-3647,86	-3703,13	-9985,30	1,7255E-07	2,75	-2318,00	-64177,78	-19407,36	-5211,24	-31008,00	727027,00	375207,41	-375207,41	-78700,00	-453907,41
2015	-87465,90	-96398,40	-25483,31	-1313,14	-305,80	-3623,87	-3678,77	-9919,60	1,71414E-07	2,73	-2302,75	-63755,56	-19279,68	-5176,95	-30804,00	727027,00	377522,01	-377522,01	-78700,00	-456222,01
2016	-95285,70	-105016,80	-27761,62	-1430,54	-333,14	-3947,85	-4007,66	-10806,45	1,86739E-07	2,98	-2508,63	-69455,56	-21003,36	-5639,79	-33558,00	727027,00	346274,87	-346274,87	-78700,00	-424974,87
2017	-98144,27	-108167,30	-28594,47	-1473,46	-343,13	-4066,29	-4127,89	-11130,65	1,92342E-07	3,07	-2583,88	-71539,22	-21633,46	-5808,98	-34564,74	727027,00	334852,31	-334852,31	-78700,00	-413552,31
2018	-101088,60	-111412,32	-29452,30	-1517,66	-353,43	-4188,28	-4251,73	-11464,57	1,98112E-07	3,16	-2661,40	-73685,40	-22282,46	-5983,25	-35601,68	727027,00	323087,07	-323087,07	-78700,00	-401787,07
2019	-104121,26	-114754,69	-30335,87	-1563,19	-364,03	-4313,93	-4379,28	-11808,50	2,04055E-07	3,26	-2741,24	-75895,96	-22950,94	-6162,75	-36669,73	727027,00	310968,87	-310968,87	-78700,00	-389668,87
2020	-107244,90	-118197,33	-31245,95	-1610,09	-374,95	-4443,34	-4510,66	-12162,76	2,10177E-07	3,35	-2823,48	-78172,84	-27860,80	-6347,63	-37769,82	727027,00	294265,79	-294265,79	-78700,00	-372965,79
2021	-110462,25	-121743,25	-32183,32	-1658,39	-386,20	-4576,64	-4645,98	-12527,64	2,16482E-07	3,45	-2908,18	-80518,02	-28696,62	-6538,06	-38902,92	727027,00	281282,96	-281282,96	-78700,00	-359982,96
2022	-113776,11	-125395,55	-33148,82	-1708,14	-397,79	-4713,94	-4785,36	-12903,47	2,22977E-07	3,56	-2995,43	-82933,57	-29557,52	-6734,21	-40070,01	727027,00	267910,64	-267910,64	-78700,00	-346610,64
2023	-117189,40	-129157,42	-34143,29	-1759,38	-409,72	-4855,36	-4928,92	-13290,58	2,29666E-07	3,66	-3085,29	-85421,57	-30444,25	-6936,23	-41272,11	727027,00	254137,15	-254137,15	-78700,00	-332837,15
2024	-120705,08	-133032,14	-35167,59	-1812,17	-422,01	-5001,02	-5076,79	-13689,29	2,36556E-07	3,77	-3177,85	-87984,22	-31357,58	-7144,32	-42510,27	727027,00	239950,45	-239950,45	-78700,00	-318650,45
2025	-124326,23	-137023,10	-36222,61	-1866,53	-434,67	-5151,05	-5229,09	-14099,97	2,43653E-07	3,89	-3273,19	-90623,75	-32298,30	-7358,65	-43785,58	727027,00	225338,15	-225338,15	-78700,00	-304038,15
2026	-128056,02	-141133,80	-37309,29	-1922,53	-447,71	-5305,59	-5385,97	-14522,97	2,50962E-07	4,00	-3371,38	-93342,46	-33267,25	-7579,41	-45099,15	727027,00	210287,49	-210287,49	-78700,00	-288987,49
2027	-131897,70	-145367,81	-38428,57	-1980,20	-461,14	-5464,75	-5547,54	-14958,66	2,58491E-07	4,12	-3472,52	-96142,73	-34265,27	-7806,79	-46452,12	727027,00	194785,30	-194785,30	-78700,00	-273485,30
2028	-135854,63	-149728,85	-39581,43	-2039,61	-474,98	-5628,70	-5713,97	-15407,42	2,66246E-07	4,25	-3576,70	-99027,01	-35293,23	-8040,99	-47845,68	727027,00	178818,05	-178818,05	-78700,00	-257518,05
2029	-139930,27	-154220,71	-40768,87	-2100,80	-489,23	-5797,56	-5885,39	-15869,64	2,74233E-07	4,38	-3684,00	-101997,82	-36352,02	-8282,22	-49281,05	727027,00	162371,78	-162371,78	-78700,00	-241071,78
2030	-144128,18	-158847,33	-41991,94	-2163,82	-503,90	-5971,48	-6061,95	-16345,73	2,8246E-07	4,51	-3794,52	-105057,76	-46519,58	-8530,69	-50759,49	727027,00	136355,14	-136355,14	-78700,00	-215055,14
2031	-148452,02	-163612,75	-43251,70	-2228,73	-519,02	-6150,63	-6243,81	-16836,10	2,90934E-07	4,64	-3908,36	-108209,49	-47915,16	-8786,61	-52282,27	727027,00	118634,98	-118634,98	-78700,00	-197334,98
2032	-152905,58	-168521,14	-44549,25	-2295,60	-534,59	-6335,15	-6431,12	-17341,19	2,99662E-07	4,78	-4025,61	-111455,78	-49352,62	-9050,21	-53850,74	727027,00	100383,22	-100383,22	-78700,00	-179083,22
2033	-157492,75	-173576,77	-45885,72	-2364,46	-550,63	-6525,20	-6624,06	-17861,42	3,08652E-07	4,92	-4146,37	-114799,45	-50833,20	-9321,72	-55466,26	727027,00	81583,91	-81583,91	-78700,00	-160283,91
2034	-162217,53	-178784,07	-47262,30	-2435,40	-567,15	-6720,96	-6822,78	-18397,27	3,17911E-07	5,07	-4270,77	-118243,43	-52358,19	-9601,37	-57130,25	727027,00	62220,61	-62220,61	-78700,00	-140920,61
2035	-167084,06	-184147,59	-48680,17	-2508,46	-584,16	-6922,59	-7027,46	-18949,18	3,27449E-07	5,22	-4398,89	-121790,74	-53928,94	-9889,41	-58844,16	727027,00	42276,42	-42276,42	-78700,00	-120976,42
2036	-172096,58	-189672,02	-50140,57	-2583,71	-601,69	-7130,26	-7238,29	-19517,66	3,37272E-07	5,38	-4530,86	-125444,46	-55546,81	-10186,09	-60609,48	727027,00	21733,91	-21733,91	-78700,00	-100433,91
2037	-177259,48	-195362,18	-51644,79	-2661,23	-619,74	-7344,17	-7455,44	-20103,19	3,4739E-07	5,54	-4666,78	-129207,79	-57213,21	-10491,67	-62427,77	727027,00	575,11	-575,11	-78700,00	-79275,11
2038	-182577,26	-201223,05	-53194,13	-2741,06	-638,33	-7564,50	-7679,10	-20706,28	3,57812E-07	5,71	-4806,78	-133084,03	-58929,61	-10806,42	-64300,60	727027,00	-21218,44	21218,44	-78700,00	-57481,56
2039	-188054,58	-207259,74	-54789,96	-2823,29	-657,48	-7791,43	-7909,47	-21327,47	3,68546E-07	5,88	-4950,99	-137076,55	-60697,50	-11130,62	-66229,62	727027,00	-43665,81	43665,81	-78700,00	-35034,19
2040	-193696,22	-213477,53	-56433,65	-2907,99	-677,20	-8025,17	-8146,76	-21967,30	3,79603E-07	6,06	-5099,52	-141188,84	-62518,42	-11464,53	-68216,50	727027,00	-66786,59	66786,59	36000000,00	36066786,59

LLEIDA - TOULOUSE

YEAR	RoadT.Time(€)	AirT.T(€)	HeavyVehiFunct(€)	Bus.Poll(€)	Bus.Noise(€)	Pass.Air.Noise(€)	B.Driv.(€)	B.Fuel(€)	Num.B.Acc.	B.Accid.(€)	Pilot(€)	Airc.Fuel(€)	Airc.Poll.(€)	Aircr.N.(€)	Aircr.Func(€)	Land(€)	CBA(€)/YEAR	BorC/ Year (€)	OtherCashFlow(€)	C.Flow/Year (€)
2010	-271810,36	591514,99	-45437,73	-2341,38	-545,25	22236,58	-11432,19	-17687,04	3,47514E-07	5,53	14129,66	391203,67	118299,99	31765,74	192719,28	727027,00	1739648,48	-1739648,48	-90000000,00	-91739648,48
2011	-145220,46	316008,00	-24276,00	-1250,93	-291,31	11879,56	-6107,89	-9449,65	1,85658E-07	2,95	7548,75	209000,00	63201,60	16970,80	102960,00	727027,00	1268002,42	-1268002,42	-78700,00	-1346702,42
2012	-145412,42	316385,57	-24307,95	-1252,57	-291,70	11893,75	-6115,97	-9462,08	1,85888E-07	2,96	7558,13	209259,67	63280,12	16991,88	103087,92	727027,00	1268644,31	-1268644,31	-78700,00	-1347344,31
2013	-129563,61	281951,18	-21658,74	-1116,06	-259,90	10599,28	-5449,37	-8430,86	1,65647E-07	2,64	6735,09	186472,33	56389,23	15141,55	91862,16	727027,00	1209701,91	-1209701,91	-78700,00	-1288401,91
2014	-133778,85	291110,40	-22363,35	-1152,37	-268,36	10943,59	-5626,66	-8705,13	1,71031E-07	2,72	6954,00	192533,33	58222,08	15633,71	94848,00	727027,00	1225380,12	-1225380,12	-78700,00	-1304080,12
2015	-132898,72	289195,20	-22216,22	-1144,79	-266,59	10871,60	-5589,65	-8647,86	1,69906E-07	2,70	6908,25	191266,67	57839,04	15530,85	94224,00	727027,00	1222101,48	-1222101,48	-78700,00	-1300801,48
2016	-144780,40	315050,40	-24202,44	-1247,14	-290,43	11843,56	-6089,38	-9421,01	1,85096E-07	2,95	7525,88	208366,67	63010,08	16919,37	102648,00	727027,00	1266363,11	-1266363,11	-78700,00	-1345063,11
2017	-149127,66	324496,90	-24929,11	-1284,58	-299,15	12198,68	-6272,23	-9703,87	1,90648E-07	3,03	7751,65	214617,67	64900,38	17426,95	105727,44	727027,00	1282533,11	-1282533,11	-78700,00	-1361233,11
2018	-153615,71	334213,24	-25679,19	-1323,23	-308,15	12563,94	-6460,99	-9995,85	1,96367E-07	3,12	7983,87	221047,14	66844,66	17949,03	108894,13	727027,00	1299143,01	-1299143,01	-78700,00	-1377843,01
2019	-158224,57	344239,14	-26449,62	-1362,93	-317,40	12940,84	-6654,84	-10295,75	2,02258E-07	3,22	8223,49	227681,34	68850,84	18487,72	112162,53	727027,00	1316311,02	-1316311,02	-78700,00	-1395011,02
2020	-162933,62	354615,47	-27237,26	-1403,52	-326,85	13330,91	-6852,90	-10602,35	2,08328E-07	3,31	8470,64	234524,09	83584,39	19043,36	115534,38	727027,00	1346777,06	-1346777,06	-78700,00	-1425477,06
2021	-167837,01	365233,87	-28056,77	-1445,75	-336,68	13730,09	-7059,13	-10921,34	2,14577E-07	3,41	8724,65	241556,79	86090,84	19614,41	118998,71	727027,00	1365323,09	-1365323,09	-78700,00	-1444023,09
2022	-172874,43	376187,88	-28898,83	-1489,14	-346,79	14141,88	-7271,00	-11249,12	2,21014E-07	3,52	8986,56	248808,14	88675,22	20203,22	122571,30	727027,00	1384475,40	-1384475,40	-78700,00	-1463175,40
2023	-178061,82	387472,01	-29765,97	-1533,82	-357,19	14566,08	-7489,18	-11586,67	2,27644E-07	3,62	9255,75	256261,24	91331,51	20808,41	126242,12	727027,00	1404173,08	-1404173,08	-78700,00	-1482873,08
2024	-183414,44	399082,12	-30660,62	-1579,92	-367,93	15002,53	-7714,31	-11934,92	2,34473E-07	3,73	9533,33	263946,52	94070,54	21432,46	130027,94	727027,00	1424454,04	-1424454,04	-78700,00	-1503154,04
2025	-188908,41	411065,62	-31579,13	-1627,25	-378,95	15453,02	-7945,38	-12292,45	2,41508E-07	3,84	9819,59	271872,12	96895,22	22076,02	133932,85	727027,00	1445413,71	-1445413,71	-78700,00	-1524113,71
2026	-194557,59	423421,17	-32523,70	-1675,93	-390,28	15917,50	-8182,98	-12660,14	2,48754E-07	3,96	10114,02	280023,87	99800,51	22737,94	137948,34	727027,00	1467003,67	-1467003,67	-78700,00	-1545703,67
2027	-200413,54	436098,72	-33502,39	-1726,36	-402,03	16394,08	-8429,28	-13041,10	2,56216E-07	4,08	10417,82	288435,03	102798,25	23420,92	142092,71	727027,00	1489173,91	-1489173,91	-78700,00	-1567873,91
2028	-206411,72	449200,24	-34505,26	-1778,04	-414,06	16886,60	-8681,56	-13431,48	2,63903E-07	4,20	10729,71	297070,20	105875,82	24122,10	146345,36	727027,00	1512039,12	-1512039,12	-78700,00	-1590739,12
2029	-212602,15	462678,76	-35540,12	-1831,36	-426,48	17393,29	-8941,93	-13834,30	2,7182E-07	4,32	11051,80	305987,88	109054,08	24846,22	150738,88	727027,00	1535605,89	-1535605,89	-78700,00	-1614305,89
2030	-218995,60	476539,06	-36608,71	-1886,43	-439,30	17914,34	-9210,83	-14250,26	2,79974E-07	4,45	11383,73	315177,97	139560,80	25592,45	155266,97	727027,00	1587075,64	-1587075,64	-78700,00	-1665775,64
2031	-225563,54	490837,74	-37706,67	-1943,00	-452,48	18451,86	-9487,08	-14677,65	2,88373E-07	4,59	11725,18	324631,45	143746,81	26360,07	159923,92	727027,00	1612878,19	-1612878,19	-78700,00	-1691578,19
2032	-232315,07	505582,93	-38835,48	-2001,17	-466,03	19006,17	-9771,04	-15117,05	2,97026E-07	4,73	12076,69	334363,66	148056,23	27150,33	164717,83	727027,00	1639479,72	-1639479,72	-78700,00	-1718179,72
2033	-239296,82	520734,37	-40002,46	-2061,30	-480,03	19575,75	-10064,69	-15571,31	3,05935E-07	4,87	12438,86	344391,09	152496,37	27964,56	169657,39	727027,00	1666813,64	-1666813,64	-78700,00	-1745513,64
2034	-246477,65	536353,89	-41202,83	-2123,16	-494,43	20162,93	-10366,71	-16038,56	3,15113E-07	5,01	12812,34	354731,41	157075,07	28804,19	174751,98	727027,00	1695020,47	-1695020,47	-78700,00	-1773720,47
2035	-253863,91	552455,04	-42437,66	-2186,79	-509,25	20768,22	-10677,38	-16519,23	3,24567E-07	5,16	13196,96	365380,32	161790,41	29668,88	179998,48	727027,00	1724096,26	-1724096,26	-78700,00	-1802796,26
2036	-261499,43	569003,11	-43713,83	-2252,55	-524,57	21390,30	-10998,52	-17016,00	3,34303E-07	5,32	13592,62	376334,76	166641,03	30558,38	185394,49	727027,00	1753942,12	-1753942,12	-78700,00	-1832642,12
2037	-269350,18	586065,68	-45026,14	-2320,17	-540,31	22031,73	-11328,72	-17526,82	3,44332E-07	5,48	14000,09	387616,21	171636,46	31474,44	190951,46	727027,00	1784716,18	-1784716,18	-78700,00	-1863416,18
2038	-277419,54	603662,20	-46375,20	-2389,69	-556,50	22693,23	-11668,11	-18051,95	3,54662E-07	5,64	14420,19	399247,49	176786,79	32418,90	196681,58	727027,00	1816482,01	-1816482,01	-78700,00	-1895182,01
2039	-285748,28	621764,04	-47767,41	-2461,43	-573,21	23373,72	-12018,41	-18593,88	3,65302E-07	5,81	14852,96	411229,55	182092,45	33391,84	202584,66	727027,00	1849159,42	-1849159,42	-78700,00	-1927859,42
2040	-294299,19	640445,05	-49197,09	-2535,10	-590,37	24075,99	-12378,06	-19150,40	3,76262E-07	5,99	15298,49	423564,82	187554,50	34393,46	208661,28	727027,00	1882876,37	-1882876,37	36000000,00	34117123,63

ANNEX 5: Sensitivity Analyses

SENSITIVITY ANALYSIS 1 - LLEIDA

YEAR	PASS	R.T.Time(€)	H.V.Funct(€)	B.Poll(€)	B.Noise(€)	B.Driver(€)	B.Fuel(€)	Num.B.Acc(€)	B.Acc(€)	TOT.BUS(30% Aigü.)(€)	TRANSP.(Air; 70% Andorra; 30% Aigü)
2010	61769	452434,45	73314,19	3777,84	879,77	19029,14	28538,19	2,50059E-07	4,30	577977,88	9524497,66
2011	33000	241712,46	39168,00	2018,30	470,02	10166,29	15246,49	1,33594E-07	2,29	308783,86	5427063,13
2012	33041	242012,77	39216,66	2020,81	470,60	10178,92	15265,43	1,3376E-07	2,30	309167,50	5432902,57
2013	29443	215658,79	34946,16	1800,76	419,35	9070,49	13603,10	1,19194E-07	2,05	275500,70	4920456,21
2014	30400	222668,45	36082,04	1859,29	432,98	9365,31	14045,25	1,23068E-07	2,11	284455,43	5056757,25
2015	30200	221203,52	35844,65	1847,05	430,14	9303,70	13952,85	1,22259E-07	2,10	282584,01	5028272,19
2016	32900	240980,00	39049,31	2012,19	468,59	10135,49	15200,29	1,33189E-07	2,29	307848,15	5412820,60
2017	33887	248209,40	40220,79	2072,55	482,65	10439,55	15656,30	1,37185E-07	2,36	317083,59	5553394,41
2018	34904	255655,68	41427,41	2134,73	497,13	10752,74	16125,99	1,413E-07	2,43	326596,10	5698185,43
2019	35951	263325,35	42670,23	2198,77	512,04	11075,32	16609,77	1,45539E-07	2,50	336393,98	5847320,18
2020	37029	271225,11	43950,34	2264,74	527,40	11407,58	17108,06	1,49905E-07	2,58	346485,80	6060027,64
2021	38140	279361,86	45268,85	2332,68	543,23	11749,81	17621,30	1,54402E-07	2,65	356880,38	6220017,66
2022	39284	287742,72	46626,92	2402,66	559,52	12102,30	18149,94	1,59035E-07	2,73	367586,79	6384807,38
2023	40463	296375,00	48025,72	2474,74	576,31	12465,37	18694,44	1,63806E-07	2,81	378614,39	6554540,79
2024	41677	305266,25	49466,50	2548,98	593,60	12839,33	19255,27	1,6872E-07	2,90	389972,82	6729366,21
2025	42927	314424,24	50950,49	2625,45	611,41	13224,51	19832,93	1,73781E-07	2,99	401672,01	6909436,38
2026	44215	323856,97	52479,01	2704,21	629,75	13621,24	20427,92	1,78995E-07	3,07	413722,17	7094908,66
2027	45541	333572,68	54053,38	2785,34	648,64	14029,88	21040,75	1,84365E-07	3,17	426133,83	7285945,11
2028	46908	343579,86	55674,98	2868,90	668,10	14450,78	21671,98	1,89896E-07	3,26	438917,85	7482712,66
2029	48315	353887,25	57345,23	2954,97	688,14	14884,30	22322,14	1,95592E-07	3,36	452085,38	7685383,23
2030	49764	364503,87	59065,58	3043,61	708,79	15330,83	22991,80	2,0146E-07	3,46	465647,95	8021211,78
2031	51257	375438,98	60837,55	3134,92	730,05	15790,76	23681,55	2,07504E-07	3,56	479617,38	8240037,32
2032	52795	386702,15	62662,68	3228,97	751,95	16264,48	24392,00	2,13729E-07	3,67	494005,91	8465427,63
2033	54379	398303,22	64542,56	3325,84	774,51	16752,41	25123,76	2,20141E-07	3,78	508826,08	8697579,65
2034	56010	410252,32	66478,83	3425,62	797,75	17254,98	25877,47	2,26745E-07	3,90	524090,86	8936696,23
2035	57690	422559,89	68473,20	3528,38	821,68	17772,63	26653,80	2,33548E-07	4,01	539813,59	9182986,31
2036	59421	435236,68	70527,40	3634,24	846,33	18305,81	27453,41	2,40554E-07	4,13	556008,00	9436665,09
2037	61204	448293,78	72643,22	3743,26	871,72	18854,99	28277,01	2,47771E-07	4,26	572688,24	9697954,23
2038	63040	461742,60	74822,51	3855,56	897,87	19420,64	29125,32	2,55204E-07	4,38	589868,89	9967082,05
2039	64931	475594,87	77067,19	3971,23	924,81	20003,26	29999,08	2,6286E-07	4,52	607564,95	10244283,70
2040	66879	489862,72	79379,21	4090,36	952,55	20603,35	30899,06	2,70746E-07	4,65	625791,90	10529801,40

SENSITIVITY ANALYSIS 1 - LLEIDA - GIRONA

YEAR	TOTALI	R.T.Time(€)	H.V.Funct(€)	B.Poll(€)	B.Noise(€)	B.Driver(€)	B.Fuel(€)	Num.B.Acc(€)	B.Acc(€)	TOT.BUS(30%Aigü.)(€)	TRANSP.(Air;70%Andorra;30%Aigü)	CBA;Lleida-Girona	BorC(€)	OtherCashFlow(€)	C.Flow(€)
2010	61769	1007818,06	154074,35	7939,36	1848,89	42388,27	59974,80	1,18987E-07	2,04	1274045,77	9334626,47	189871,19	-189871,19	-90000000	-90189871,19
2011	33000	538425,36	82314,00	4241,59	987,77	22645,87	32041,45	6,35688E-08	1,09	680657,13	4987010,86	440052,28	-440052,28	-78700	-518752,28
2012	33041	539094,31	82416,27	4246,86	989,00	22674,01	32081,26	6,36478E-08	1,09	681502,80	4993206,84	439695,73	-439695,73	-78700	-518395,73
2013	29443	480389,63	73441,55	3784,40	881,30	20204,92	28587,77	5,67168E-08	0,97	607290,55	4449471,53	470984,67	-470984,67	-78700	-549684,67
2014	30400	496003,97	75828,65	3907,41	909,94	20861,65	29516,97	5,85603E-08	1,01	627029,60	4594094,85	462662,41	-462662,41	-78700	-541362,41
2015	30200	492740,78	75329,78	3881,70	903,96	20724,40	29322,78	5,81751E-08	1,00	622904,41	4563870,54	464401,65	-464401,65	-78700	-543101,65
2016	32900	536793,77	82064,56	4228,74	984,77	22577,25	31944,36	6,33761E-08	1,09	678594,54	4971898,70	440921,90	-440921,90	-78700	-519621,90
2017	33887	552897,58	84526,50	4355,60	1014,32	23254,57	32902,69	6,52774E-08	1,12	698952,37	5121055,66	432338,74	-432338,74	-78700	-511038,74
2018	34904	569484,51	87062,30	4486,27	1044,75	23952,20	33889,77	6,72357E-08	1,16	719920,94	5274687,33	423498,10	-423498,10	-78700	-502198,10
2019	35951	586569,04	89674,16	4620,86	1076,09	24670,77	34906,46	6,92528E-08	1,19	741518,57	5432927,95	414392,23	-414392,23	-78700	-493092,23
2020	37029	604166,12	92364,39	4759,48	1108,37	25410,89	35953,65	7,13304E-08	1,23	763764,13	5650793,12	409234,52	-409234,52	-78700	-487934,52
2021	38140	622291,10	95135,32	4902,27	1141,62	26173,22	37032,26	7,34703E-08	1,26	786677,05	5820316,92	399700,74	-399700,74	-78700	-478400,74
2022	39284	640959,83	97989,38	5049,34	1175,87	26958,41	38143,23	7,56744E-08	1,30	810277,37	5994926,43	389880,96	-389880,96	-78700	-468580,96
2023	40463	660188,63	100929,06	5200,82	1211,15	27767,17	39287,53	7,79447E-08	1,34	834585,69	6174774,22	379766,58	-379766,58	-78700	-458466,58
2024	41677	679994,29	103956,93	5356,84	1247,48	28600,18	40466,15	8,0283E-08	1,38	859623,26	6360017,44	369348,76	-369348,76	-78700	-448048,76
2025	42927	700394,11	107075,64	5517,54	1284,91	29458,19	41680,14	8,26915E-08	1,42	885411,96	6550817,97	358618,42	-358618,42	-78700	-437318,42
2026	44215	721405,94	110287,91	5683,07	1323,45	30341,93	42930,54	8,51722E-08	1,46	911974,31	6747342,51	347566,16	-347566,16	-78700	-426266,16
2027	45541	743048,12	113596,55	5853,56	1363,16	31252,19	44218,46	8,77274E-08	1,51	939333,54	6949762,78	336182,33	-336182,33	-78700	-414882,33
2028	46908	765339,56	117004,45	6029,17	1404,05	32189,76	45545,01	9,03592E-08	1,55	967513,55	7158255,67	324456,99	-324456,99	-78700	-403156,99
2029	48315	788299,75	120514,58	6210,05	1446,17	33155,45	46911,36	9,307E-08	1,60	996538,96	7373003,34	312379,89	-312379,89	-78700	-391079,89
2030	49764	811948,74	124130,02	6396,35	1489,56	34150,11	48318,70	9,58621E-08	1,65	1026435,12	7712194,31	309017,47	-309017,47	-78700	-387717,47
2031	51257	836307,20	127853,92	6588,24	1534,25	35174,62	49768,27	9,8738E-08	1,70	1057228,18	7943560,14	296477,18	-296477,18	-78700	-375177,18
2032	52795	861396,42	131689,53	6785,88	1580,27	36229,86	51261,31	1,017E-07	1,75	1088945,02	8181866,94	283560,69	-283560,69	-78700	-362260,69
2033	54379	887238,31	135640,22	6989,46	1627,68	37316,75	52799,15	1,04751E-07	1,80	1121613,37	8427322,95	270256,70	-270256,70	-78700	-348956,70
2034	56010	913855,46	139709,43	7199,14	1676,51	38436,25	54383,13	1,07894E-07	1,85	1155261,78	8680142,64	256553,59	-256553,59	-78700	-335253,59
2035	57690	941271,12	143900,71	7415,12	1726,81	39589,34	56014,62	1,1113E-07	1,91	1189919,63	8940546,92	242439,39	-242439,39	-78700	-321139,39
2036	59421	969509,26	148217,73	7637,57	1778,61	40777,02	57695,06	1,14464E-07	1,97	1225617,22	9208763,33	227901,76	-227901,76	-78700	-306601,76
2037	61204	998594,53	152664,26	7866,70	1831,97	42000,33	59425,91	1,17898E-07	2,03	1262385,73	9485026,23	212928,00	-212928,00	-78700	-291628,00
2038	63040	1028552,37	157244,19	8102,70	1886,93	43260,34	61208,69	1,21435E-07	2,09	1300257,31	9769577,02	197505,03	-197505,03	-78700	-276205,03
2039	64931	1059408,94	161961,52	8345,78	1943,54	44558,15	63044,95	1,25078E-07	2,15	1339265,03	10062664,33	181619,37	-181619,37	-78700	-260319,37
2040	66879	1091191,21	166820,36	8596,16	2001,84	45894,90	64936,30	1,28831E-07	2,21	1379442,98	10364544,26	165257,15	-165257,15	36000000	35834742,85

SENSITIVITY ANALYSIS 1 - LLEIDA - REUS

YEAR	PASS	R.T.Time(€)	H.V.Funct(€)	B.Poll(€)	B.Noise(€)	B.Driver(€)	B.Fuel(€)	Num.B.Acc(€)	B.Acc(€)	TOT.BUS(30% Aigü.)(€)	TRANSP.(Air; 70% Andorra; 30% Aigü)	CBA; Lleida-Reus	BorC (€)	OtherCashFlow(€)	C.Flow(€)
2010	61769	807338,13	130590,90	6729,27	1567,09	33956,19	50833,66	1,40384E-07	2,41	1031017,65	10500620,41	-976122,75	976122,75	-90000000	-89023877,25
2011	33000	431319,24	69768,00	3595,10	837,22	18141,05	27157,81	0,000000075	1,29	550819,71	5609941,45	-182878,32	182878,32	-78700	104178,32
2012	33041	431855,12	69854,68	3599,57	838,26	18163,59	27191,55	7,50932E-08	1,29	551504,06	5616911,38	-184008,81	184008,81	-78700	105308,81
2013	29443	384828,25	62247,86	3207,60	746,97	16185,66	24230,53	6,69159E-08	1,15	491448,02	5005257,76	-84801,56	84801,56	-78700	6101,56
2014	30400	397336,51	64271,13	3311,85	771,25	16711,75	25018,10	6,90909E-08	1,19	507421,79	5167946,06	-111188,81	111188,81	-78700	32488,81
2015	30200	394722,46	63848,29	3290,06	766,18	16601,81	24853,51	6,86364E-08	1,18	504083,49	5133946,42	-105674,23	105674,23	-78700	26974,23
2016	32900	430012,21	69556,58	3584,21	834,68	18086,08	27075,51	7,47727E-08	1,28	549150,56	5592941,63	-180121,03	180121,03	-78700	101421,03
2017	33887	442912,58	71643,28	3691,74	859,72	18628,66	27887,78	7,70159E-08	1,32	565625,07	5760729,88	-207335,47	207335,47	-78700	128635,47
2018	34904	456199,96	73792,58	3802,49	885,51	19187,52	28724,41	7,93264E-08	1,36	582593,82	5933551,77	-235366,35	235366,35	-78700	156666,35
2019	35951	469885,95	76006,35	3916,56	912,08	19763,14	29586,14	8,17062E-08	1,40	600071,64	6111558,33	-264238,15	264238,15	-78700	185538,15
2020	37029	483982,53	78286,55	4034,06	939,44	20356,04	30473,73	8,41574E-08	1,45	618073,79	6362446,41	-302418,77	302418,77	-78700	223718,77
2021	38140	498502,01	80635,14	4155,08	967,62	20966,72	31387,94	8,66821E-08	1,49	636616,00	6553319,80	-333302,14	333302,14	-78700	254602,14
2022	39284	513457,07	83054,20	4279,73	996,65	21595,72	32329,58	8,92825E-08	1,53	655714,48	6749919,40	-365112,01	365112,01	-78700	286412,01
2023	40463	528860,78	85545,82	4408,13	1026,55	22243,59	33299,47	9,1961E-08	1,58	675385,92	6952416,98	-397876,18	397876,18	-78700	319176,18
2024	41677	544726,60	88112,20	4540,37	1057,35	22910,90	34298,45	9,47199E-08	1,63	695647,49	7160989,49	-431623,28	431623,28	-78700	352923,28
2025	42927	561068,40	90755,56	4676,58	1089,07	23598,23	35327,40	9,75614E-08	1,68	716516,92	7375819,17	-466382,79	466382,79	-78700	387682,79
2026	44215	577900,46	93478,23	4816,88	1121,74	24306,17	36387,23	1,00488E-07	1,73	738012,43	7597093,75	-502185,08	502185,08	-78700	423485,08
2027	45541	595237,47	96282,58	4961,38	1155,39	25035,36	37478,84	1,03503E-07	1,78	760152,80	7825006,56	-539061,44	539061,44	-78700	460361,44
2028	46908	613094,59	99171,05	5110,23	1190,05	25786,42	38603,21	1,06608E-07	1,83	782957,38	8059756,76	-577044,10	577044,10	-78700	498344,10
2029	48315	631487,43	102146,19	5263,53	1225,75	26560,01	39761,30	1,09806E-07	1,89	806446,10	8301549,46	-616166,23	616166,23	-78700	537466,23
2030	49764	650432,05	105210,57	5421,44	1262,53	27356,81	40954,14	1,131E-07	1,94	830639,49	8695827,79	-674616,01	674616,01	-78700	595916,01
2031	51257	669945,02	108366,89	5584,08	1300,40	28177,52	42182,77	1,16493E-07	2,00	855558,67	8956702,62	-716665,30	716665,30	-78700	637965,30
2032	52795	690043,37	111617,89	5751,60	1339,41	29022,84	43448,25	1,19988E-07	2,06	881225,43	9225403,70	-759976,07	759976,07	-78700	681276,07
2033	54379	710744,67	114966,43	5924,15	1379,60	29893,53	44751,70	1,23588E-07	2,12	907662,20	9502165,81	-804586,16	804586,16	-78700	725886,16
2034	56010	732067,01	118415,42	6101,88	1420,99	30790,33	46094,25	1,27296E-07	2,19	934892,06	9787230,79	-850534,56	850534,56	-78700	771834,56
2035	57690	754029,02	121967,89	6284,93	1463,61	31714,04	47477,08	1,31114E-07	2,25	962938,82	10080847,71	-897861,40	897861,40	-78700	819161,40
2036	59421	776649,89	125626,92	6473,48	1507,52	32665,46	48901,39	1,35048E-07	2,32	991826,99	10383273,14	-946608,05	946608,05	-78700	867908,05
2037	61204	799949,38	129395,73	6667,69	1552,75	33645,43	50368,43	1,39099E-07	2,39	1021581,80	10694771,34	-996817,11	996817,11	-78700	918117,11
2038	63040	823947,87	133277,60	6867,72	1599,33	34654,79	51879,48	1,43272E-07	2,46	1052229,25	11015614,48	-1048532,43	1048532,43	-78700	969832,43
2039	64931	848666,30	137275,93	7073,75	1647,31	35694,43	53435,87	1,4757E-07	2,54	1083796,13	11346082,91	-1101799,21	1101799,21	-78700	1023099,21
2040	66879	874126,29	141394,21	7285,96	1696,73	36765,27	55038,94	1,51998E-07	2,61	1116310,01	11686465,40	-1156664,00	1156664,00	36000000	37156664,00

SENSITIVITY ANALYSIS 1 - LLEIDA - BCN

YEAR	PASS	R.T.Time(€)	H.V.Funct(€)	B.Poll(€)	B.Noise(€)	B.Driver(€)	B.Fuel(€)	Num.B.Acc(€)	B.Acc(€)	TOT.BUS(30% Aigü.)(€)	TRANSP.(Air; 70% Andorra; 30% Aigü)	CBA; Lleida-BCN	BorC (€)	OtherCashFlow(€)	C.Flow(€)
2010	61769	934669,98	148346,68	7644,22	1780,16	39311,70	57745,25	1,23581E-07	2,12	1189500,11	10123846,33	-599348,66	599348,66	-90000000	-89400651,34
2011	33000	499346,10	79254,00	4083,91	951,05	21002,22	30850,32	6,60232E-08	1,13	635488,73	5408650,44	18412,70	-18412,70	-78700	-97112,70
2012	33041	499966,50	79352,47	4088,99	952,23	21028,31	30888,65	6,61052E-08	1,14	636278,28	5415370,27	17532,30	-17532,30	-78700	-96232,30
2013	29443	445522,64	70711,38	3643,72	848,54	18738,44	27525,03	5,89067E-08	1,01	566990,75	4825663,48	94792,73	-94792,73	-78700	-173492,73
2014	30400	460003,68	73009,75	3762,15	876,12	19347,50	28419,69	6,08213E-08	1,04	585419,92	4982514,34	74242,91	-74242,91	-78700	-152942,91
2015	30200	456977,34	72529,42	3737,40	870,35	19220,21	28232,72	6,04212E-08	1,04	581568,48	4949734,64	78537,55	-78537,55	-78700	-157237,55
2016	32900	497832,93	79013,84	4071,54	948,17	20938,58	30756,83	6,58231E-08	1,13	633563,01	5392260,59	20560,01	-20560,01	-78700	-99260,01
2017	33887	512767,92	81384,25	4193,68	976,61	21566,73	31679,54	6,77978E-08	1,16	652569,90	5554028,40	-634,00	634,00	-78700	-78066,00
2018	34904	528156,86	83826,72	4319,54	1005,92	22213,98	32630,29	6,98325E-08	1,20	672154,51	5720656,77	-22471,34	22471,34	-78700	-56228,66
2019	35951	543999,75	86341,23	4449,11	1036,09	22880,33	33609,09	7,19272E-08	1,24	692316,83	5892274,16	-44953,98	44953,98	-78700	-33746,02
2020	37029	560311,72	88930,19	4582,52	1067,16	23566,40	34616,86	7,4084E-08	1,27	713076,13	6132352,18	-72324,53	72324,53	-78700	-6375,47
2021	38140	577123,04	91598,41	4720,01	1099,18	24273,47	35655,49	7,63068E-08	1,31	734470,92	6316325,24	-96307,58	96307,58	-78700	17607,58
2022	39284	594433,70	94345,88	4861,59	1132,15	25001,55	36724,97	7,85956E-08	1,35	756501,19	6505811,15	-121003,77	121003,77	-78700	42303,77
2023	40463	612273,98	97177,41	5007,49	1166,13	25751,90	37827,17	8,09544E-08	1,39	779205,47	6700994,73	-146453,94	146453,94	-78700	67753,94
2024	41677	630643,86	100093,00	5157,73	1201,12	26524,53	38962,08	8,33833E-08	1,43	802583,76	6902026,69	-172660,48	172660,48	-78700	93960,48
2025	42927	649558,49	103095,04	5312,43	1237,14	27320,07	40130,66	8,58841E-08	1,48	826655,30	7109081,52	-199645,14	199645,14	-78700	120945,14
2026	44215	669048,12	106188,35	5471,82	1274,26	28139,79	41334,75	8,8461E-08	1,52	851458,62	7322357,62	-227448,96	227448,96	-78700	148748,96
2027	45541	689112,75	109372,92	5635,92	1312,48	28983,70	42574,37	9,1114E-08	1,57	876993,71	7542019,69	-256074,57	256074,57	-78700	177374,57
2028	46908	709797,78	112655,96	5805,10	1351,87	29853,70	43852,33	9,38489E-08	1,61	903318,35	7768295,11	-285582,45	285582,45	-78700	206882,45
2029	48315	731088,09	116035,06	5979,22	1392,42	30749,16	45167,67	9,66639E-08	1,66	930413,28	8001339,34	-315956,11	315956,11	-78700	237256,11
2030	49764	753013,92	119515,03	6158,54	1434,18	31671,35	46522,28	9,95629E-08	1,71	958317,01	8377525,71	-356313,93	356313,93	-78700	277613,93
2031	51257	775605,55	123100,68	6343,31	1477,21	32621,54	47918,02	1,0255E-07	1,76	987068,06	8628853,02	-388815,70	388815,70	-78700	310115,70
2032	52795	798878,10	126794,39	6533,64	1521,53	33600,37	49355,84	1,05627E-07	1,81	1016685,69	8887724,20	-422296,56	422296,56	-78700	343596,56
2033	54379	822846,71	130598,58	6729,67	1567,18	34608,48	50836,65	1,08796E-07	1,87	1047189,15	9154358,81	-456779,16	456779,16	-78700	378079,16
2034	56010	847526,52	134515,65	6931,51	1614,19	35646,50	52361,40	1,12059E-07	1,93	1078597,69	9428982,45	-492286,22	492286,22	-78700	413586,22
2035	57690	872947,77	138550,40	7139,42	1662,60	36715,70	53931,97	1,1542E-07	1,98	1110949,85	9711846,14	-528859,84	528859,84	-78700	450159,84
2036	59421	899140,75	142707,63	7353,64	1712,49	37817,36	55550,21	1,18884E-07	2,04	1144284,12	10003207,31	-566542,22	566542,22	-78700	487842,22
2037	61204	926120,57	146989,75	7574,30	1763,88	38952,12	57217,06	1,22451E-07	2,10	1178619,77	10303310,65	-605356,42	605356,42	-78700	526656,42
2038	63040	953902,37	151399,16	7801,51	1816,79	40120,60	58933,46	1,26124E-07	2,17	1213976,05	10612407,66	-645325,61	645325,61	-78700	566625,61
2039	64931	982516,41	155940,65	8035,53	1871,29	41324,10	60701,27	1,29908E-07	2,23	1250391,48	10930776,04	-686492,34	686492,34	-78700	607792,34
2040	66879	1011992,96	160619,04	8276,60	1927,43	42563,86	62522,38	1,33805E-07	2,30	1287904,57	11258700,67	-728899,27	728899,27	36000000	36728899,27

SENSITIVITY ANALYSIS 1 - LLEIDA - TOULOUSE

YEAR	PASS	R.T.Time(€)	H.V.Funct(€)	B.Poll(€)	B.Noise(€)	B.Driver(€)	B.Fuel(€)	Num.B.Acc(€)	B.Acc(€)	TOT.BUS(30% Aigü.)(€)	TRANSP.(Air; 70% Andorra; 30% Aigü)	CBA; Lleida-BCN	BorC (€)	OtherCashFlow(€)	C.Flow(€)
2010	61769	804628,94	126581,53	6522,67	1518,98	33842,25	49272,98	1,44831E-07	2,49	1022369,83	8229241,13	1295256,53	-1295256,53	-90000000	-91295256,53
2011	33000	429871,86	67626,00	3484,73	811,51	18080,17	26324,02	7,73756E-08	1,33	546199,62	4396476,47	1030586,66	-1030586,66	-78700	-1109286,66
2012	33041	430405,94	67710,02	3489,06	812,52	18102,64	26356,72	7,74717E-08	1,33	546878,23	4401968,99	1030933,58	-1030933,58	-78700	-1109633,58
2013	29443	383536,88	60336,74	3109,12	724,04	16131,35	23486,61	6,90354E-08	1,19	487325,92	3922579,52	997876,69	-997876,69	-78700	-1076576,69
2014	30400	396003,17	62297,89	3210,17	747,57	16655,67	24250,00	7,12793E-08	1,22	503165,71	4050087,41	1006669,84	-1006669,84	-78700	-1085369,84
2015	30200	393397,88	61888,04	3189,05	742,66	16546,10	24090,46	7,08104E-08	1,22	499855,41	4023442,10	1004830,09	-1004830,09	-78700	-1083530,09
2016	32900	428569,22	67421,07	3474,17	809,05	18025,38	26244,25	7,71411E-08	1,33	544544,47	4383153,81	1029666,79	-1029666,79	-78700	-1108366,79
2017	33887	441426,29	69443,70	3578,39	833,32	18566,15	27031,57	7,94553E-08	1,36	560880,80	4514658,50	1038735,90	-1038735,90	-78700	-1117435,90
2018	34904	454674,16	71527,82	3685,79	858,33	19123,34	27842,83	8,18399E-08	1,41	577713,68	4650159,99	1048025,43	-1048025,43	-78700	-1126725,43
2019	35951	468312,83	73673,40	3796,35	884,08	19696,98	28678,02	8,42948E-08	1,45	595043,11	4789658,28	1057661,90	-1057661,90	-78700	-1136361,90
2020	37029	482355,31	75882,52	3910,18	910,59	20287,60	29537,94	8,68224E-08	1,49	612885,63	4979650,41	1080377,23	-1080377,23	-78700	-1159077,23
2021	38140	496827,66	78159,26	4027,50	937,91	20896,30	30424,18	8,94274E-08	1,54	631274,35	5129088,54	1090929,12	-1090929,12	-78700	-1169629,12
2022	39284	511729,88	80503,63	4148,30	966,04	21523,08	31336,75	9,21097E-08	1,58	650209,27	5282954,46	1101852,92	-1101852,92	-78700	-1180552,92
2023	40463	527088,03	82919,72	4272,80	995,04	22169,03	32277,23	9,48742E-08	1,63	669723,49	5441476,81	1113063,99	-1113063,99	-78700	-1191763,99
2024	41677	542902,11	85407,54	4401,00	1024,89	22834,16	33245,64	9,77206E-08	1,68	689817,02	5604756,36	1124609,84	-1124609,84	-78700	-1203309,84
2025	42927	559185,13	87969,13	4533,00	1055,63	23519,02	34242,76	1,00652E-07	1,73	710506,39	5772857,06	1136579,32	-1136579,32	-78700	-1215279,32
2026	44215	575963,16	90608,59	4669,01	1087,30	24224,69	35270,19	1,03672E-07	1,78	731824,73	5946007,55	1148901,11	-1148901,11	-78700	-1227601,11
2027	45541	593236,19	93325,93	4809,03	1119,91	24951,19	36327,94	1,06781E-07	1,83	753772,02	6124409,40	1161535,71	-1161535,71	-78700	-1240235,71
2028	46908	611043,31	96127,29	4953,38	1153,53	25700,14	37418,39	1,09986E-07	1,89	776397,93	6308153,62	1174559,03	-1174559,03	-78700	-1253259,03
2029	48315	629371,48	99010,61	5101,96	1188,13	26471,02	38540,75	1,13285E-07	1,95	799685,90	6497377,85	1188005,38	-1188005,38	-78700	-1266705,38
2030	49764	648246,76	101980,01	5254,97	1223,76	27264,90	39696,62	1,16682E-07	2,00	823669,02	6792157,22	1229054,57	-1229054,57	-78700	-1307754,57
2031	51257	667695,21	105039,57	5412,63	1260,47	28082,89	40887,58	1,20183E-07	2,06	848380,42	6995922,17	1244115,16	-1244115,16	-78700	-1322815,16
2032	52795	687729,84	108191,35	5575,04	1298,30	28925,54	42114,44	1,23789E-07	2,13	873836,63	7205778,64	1259648,99	-1259648,99	-78700	-1338348,99
2033	54379	708363,69	111437,40	5742,30	1337,25	29793,38	43377,99	1,27503E-07	2,19	900054,21	7421994,14	1275585,51	-1275585,51	-78700	-1354285,51
2034	56010	729609,78	114779,77	5914,53	1377,36	30686,98	44679,04	1,31327E-07	2,26	927049,72	7644634,61	1292061,62	-1292061,62	-78700	-1370761,62
2035	57690	751494,17	118222,54	6091,94	1418,67	31607,43	46019,17	1,35267E-07	2,32	954856,24	7873932,70	1309053,61	-1309053,61	-78700	-1387753,61
2036	59421	774042,90	121769,83	6274,73	1461,24	32555,82	47399,98	1,39325E-07	2,39	983506,89	8110221,86	1326443,23	-1326443,23	-78700	-1405143,23
2037	61204	797269,01	125423,69	6463,01	1505,08	33532,69	48822,28	1,43506E-07	2,47	1013018,23	8353568,03	1344386,20	-1344386,20	-78700	-1423086,20
2038	63040	821185,52	129186,15	6656,89	1550,23	34538,61	50286,85	1,47811E-07	2,54	1043406,79	8604137,94	1362944,11	-1362944,11	-78700	-1441644,11
2039	64931	845818,48	133061,33	6856,57	1596,74	35574,66	51795,30	1,52245E-07	2,62	1074705,68	8862265,01	1382018,69	-1382018,69	-78700	-1460718,69
2040	66879	871193,94	137053,31	7062,28	1644,64	36641,93	53349,21	1,56812E-07	2,69	1106948,01	9128081,14	1401720,26	-1401720,26	36000000	34598279,74

SENSITIVITY ANALYSIS 2 - LLEIDA

YEAR	PASS	TOT.AIR.TRANSP(€)	R.T.Time(€)	H.V.Funct€)	B.Pol.(€)	B.Noise(€	B.Driver(€;	B.Fuel(€)	Num.B.A	B.Acc(€)	BUS T.(70% Boí)(€)	TRANSP.(Air; 70% Boí; 30% Aigüestortes)(€)
2010	61769	6461562,71	1232680,69	176412,26	9090,42	2116,95	51845,87	68670,03	5,7E-07	9,72	1540825,94	8580366,53
2011	33000	3452080,65	658557,90	94248,00	4856,54	1130,98	27698,58	36686,87	3E-07	5,19	823184,06	4584048,56
2012	33041	3456369,60	659376,11	94365,10	4862,58	1132,38	27732,99	36732,45	3E-07	5,20	824206,80	4589743,89
2013	29443	3079988,20	587573,34	84089,21	4333,07	1009,07	24713,01	32732,47	2,7E-07	4,63	734454,79	4089943,69
2014	30400	3180098,54	606671,52	86822,40	4473,91	1041,87	25516,27	33796,39	2,8E-07	4,78	758327,13	4222881,10
2015	30200	3159176,83	602680,26	86251,20	4444,47	1035,01	25348,40	33574,04	2,8E-07	4,75	753338,14	4195098,99
2016	32900	3441619,80	656562,27	93962,40	4841,83	1127,55	27614,64	36575,69	3E-07	5,18	820689,56	4570157,51
2017	33887	3544868,39	676259,14	96781,27	4987,08	1161,38	28443,08	37672,96	3,1E-07	5,33	845310,25	4707262,23
2018	34904	3651214,44	696546,91	99684,71	5136,69	1196,22	29296,38	38803,15	3,2E-07	5,49	870669,56	4848480,10
2019	35951	3760750,88	717443,32	102675,25	5290,80	1232,10	30175,27	39967,25	3,3E-07	5,66	896789,64	4993934,50
2020	37029	3932672,07	738966,62	105755,51	5449,52	1269,07	31080,53	41166,27	3,4E-07	5,83	923693,33	5202851,20
2021	38140	4050652,23	761135,62	108928,17	5613,00	1307,14	32012,94	42401,25	3,5E-07	6,00	951404,13	5358936,74
2022	39284	4172171,80	783969,69	112196,02	5781,39	1346,35	32973,33	43673,29	3,6E-07	6,18	979946,26	5519704,84
2023	40463	4297336,95	807488,78	115561,90	5954,84	1386,74	33962,53	44983,49	3,7E-07	6,37	1009344,64	5685295,99
2024	41677	4426257,06	831713,44	119028,76	6133,48	1428,35	34981,41	46332,99	3,8E-07	6,56	1039624,98	5855854,86
2025	42927	4559044,77	856664,84	122599,62	6317,49	1471,20	36030,85	47722,98	3,9E-07	6,75	1070813,73	6031530,51
2026	44215	4695816,11	882364,79	126277,61	6507,01	1515,33	37111,77	49154,67	4E-07	6,96	1102938,14	6212476,43
2027	45541	4836690,60	908835,73	130065,94	6702,22	1560,79	38225,13	50629,31	4,2E-07	7,17	1136026,29	6398850,72
2028	46908	4981791,32	936100,80	133967,91	6903,29	1607,61	39371,88	52148,19	4,3E-07	7,38	1170107,08	6590816,24
2029	48315	5131245,06	964183,83	137986,95	7110,39	1655,84	40553,04	53712,64	4,4E-07	7,60	1205210,29	6788540,73
2030	49764	5412260,27	993109,34	142126,56	7323,70	1705,52	41769,63	55324,02	4,6E-07	7,83	1241366,60	7119274,82
2031	51257	5574628,08	1022902,62	146390,36	7543,41	1756,68	43022,72	56983,74	4,7E-07	8,07	1278607,60	7332853,06
2032	52795	5741866,92	1053589,70	150782,07	7769,71	1809,38	44313,40	58693,25	4,8E-07	8,31	1316965,82	7552838,65
2033	54379	5914122,93	1085197,39	155305,53	8002,80	1863,67	45642,80	60454,05	5E-07	8,56	1356474,80	7779423,81
2034	56010	6091546,62	1117753,32	159964,70	8242,89	1919,58	47012,08	62267,67	5,1E-07	8,81	1397169,04	8012806,53
2035	57690	6274293,02	1151285,91	164763,64	8490,17	1977,16	48422,45	64135,70	5,3E-07	9,08	1439084,11	8253190,72
2036	59421	6462521,81	1185824,49	169706,55	8744,88	2036,48	49875,12	66059,77	5,4E-07	9,35	1482256,64	8500786,44
2037	61204	6656397,46	1221399,23	174797,74	9007,22	2097,57	51371,37	68041,56	5,6E-07	9,63	1526724,34	8755810,04
2038	63040	6856089,39	1258041,20	180041,67	9277,44	2160,50	52912,52	70082,81	5,8E-07	9,92	1572526,07	9018484,34
2039	64931	7061772,07	1295782,44	185442,93	9555,76	2225,32	54499,89	72185,29	5,9E-07	10,22	1619701,85	9289038,87
2040	66879	7273625,23	1334655,91	191006,21	9842,44	2292,07	56134,89	74350,85	6,1E-07	10,52	1668292,90	9567710,03

SENSITIVITY ANALYSIS 2 - LLEIDA - GIRONA

YEAR	PASS	TOT.AIR.TRANSP(€)	R.T.Time(€)	H.V.Funct€)	B.Pol.(€)	B.Noise(€	B.Driver(€)	B.Fuel(€)	Num.B.A	B.Acc(€)	BUS T.(70% Boí)(€)	TRANSP.(Air; 70% Boí; 30% Aigüestortes)(€)	CBALleida-Girona	BorC(€)/Year	OtherCashFlow(€)	C.Flow(€)
2010	61769	6007611,28	2604433,06	407619,25	21004,38	4891,43	109541,01	158669,39	7,7E-08	1,61	3306160,12	10587817,17	-2007450,64	2007450,64	-90000000	-87992549,36
2011	33000	3209557,74	1391414,64	217770,00	11221,56	2613,24	58522,13	84768,89	4,1E-08	0,86	1766311,32	5656526,20	-1072477,64	1072477,64	-78700	993777,64
2012	33041	3213545,38	1393143,37	218040,56	11235,50	2616,49	58594,84	84874,21	4,1E-08	0,86	1768505,83	5663554,00	-1073810,11	1073810,11	-78700	995110,11
2013	29443	2863606,32	1241437,01	194297,03	10012,01	2331,56	52214,15	75631,83	3,7E-08	0,77	1575924,37	5046821,24	-956877,55	956877,55	-78700	878177,55
2014	30400	2956683,50	1281788,03	200612,36	10337,44	2407,35	53911,29	78090,13	3,8E-08	0,79	1627147,40	5210860,50	-987979,40	987979,40	-78700	909279,40
2015	30200	2937231,63	1273355,22	199292,55	10269,43	2391,51	53556,61	77576,38	3,8E-08	0,79	1616442,48	5176578,52	-981479,53	981479,53	-78700	902779,53
2016	32900	3199831,81	1387198,23	217110,09	11187,56	2605,32	58344,79	84512,02	4,1E-08	0,86	1760958,86	5639385,21	-1069227,71	1069227,71	-78700	990527,71
2017	33887	3295826,77	1428814,18	223623,39	11523,18	2683,48	60095,13	87047,38	4,2E-08	0,88	1813787,63	5808566,77	-1101304,54	1101304,54	-78700	1022604,54
2018	34904	3394701,57	1471695,05	230334,67	11869,01	2764,02	61898,68	89659,80	4,4E-08	0,91	1868222,13	5982844,64	-1134364,55	1134364,55	-78700	1055664,55
2019	35951	3496542,62	1515840,84	237243,92	12225,04	2846,93	63755,42	92349,29	4,5E-08	0,94	1924262,37	6162323,56	-1168389,06	1168389,06	-78700	1089689,06
2020	37029	3656316,23	1561293,72	244357,74	12591,61	2932,29	65667,15	95118,41	4,6E-08	0,96	1981961,88	6402042,23	-1199191,03	1199191,03	-78700	1120491,03
2021	38140	3766005,71	1608138,01	251689,33	12969,40	3020,27	67637,39	97972,29	4,8E-08	0,99	2041427,69	6594110,46	-1235173,72	1235173,72	-78700	1156473,72
2022	39284	3878985,89	1656373,72	259238,69	13358,42	3110,86	69666,16	100910,95	4,9E-08	1,02	2102659,82	6791923,07	-1272218,23	1272218,23	-78700	1193518,23
2023	40463	3995355,46	1706085,17	267019,02	13759,33	3204,23	71757,00	103939,51	5,1E-08	1,05	2165765,30	6995706,45	-1310410,47	1310410,47	-78700	1231710,47
2024	41677	4115216,13	1757272,36	275030,31	14172,15	3300,36	73909,90	107057,98	5,2E-08	1,08	2230744,15	7205583,53	-1349728,67	1349728,67	-78700	1271028,67
2025	42927	4238672,61	1809977,46	283279,18	14597,21	3399,35	76126,65	110268,92	5,4E-08	1,12	2297649,88	7421734,45	-1390203,93	1390203,93	-78700	1311503,93
2026	44215	4365832,79	1864284,80	291778,80	15035,19	3501,35	78410,78	113577,47	5,5E-08	1,15	2366589,55	7644396,65	-1431920,22	1431920,22	-78700	1353220,22
2027	45541	4496807,77	1920194,37	300529,20	15486,09	3606,35	80762,31	116983,64	5,7E-08	1,18	2437563,15	7873704,46	-1474853,74	1474853,74	-78700	1396153,74
2028	46908	4631712,00	1977832,66	309550,16	15950,94	3714,60	83186,54	120495,13	5,9E-08	1,22	2510731,26	8109956,81	-1519140,57	1519140,57	-78700	1440440,57
2029	48315	4770663,36	2037157,53	318835,08	16429,38	3826,02	85681,72	124109,37	6E-08	1,26	2586040,35	8353242,67	-1564701,94	1564701,94	-78700	1486001,94
2030	49764	5031784,14	2098253,28	328397,16	16922,11	3940,77	88251,37	127831,49	6,2E-08	1,29	2663597,47	8721816,74	-1602541,92	1602541,92	-78700	1523841,92
2031	51257	5182737,67	2161204,25	338249,60	17429,80	4059,00	90899,05	131666,64	6,4E-08	1,33	2743509,68	8983475,52	-1650622,46	1650622,46	-78700	1571922,46
2032	52795	5338219,80	2226052,60	348399,00	17952,80	4180,79	93626,54	135617,39	6,6E-08	1,37	2825830,49	9252995,31	-1700156,66	1700156,66	-78700	1621456,66
2033	54379	5498366,39	2292840,51	358851,96	18491,43	4306,22	96435,60	139686,29	6,8E-08	1,41	2910613,43	9530593,20	-1751169,39	1751169,39	-78700	1672469,39
2034	56010	5663317,38	2361610,12	369615,08	19046,05	4435,38	99328,01	143875,93	7E-08	1,46	2997912,03	9816491,19	-1803684,66	1803684,66	-78700	1724984,66
2035	57690	5833216,90	2432445,78	380701,55	19617,33	4568,42	102307,32	148191,44	7,2E-08	1,50	3087833,34	10110969,87	-1857779,15	1857779,15	-78700	1779079,15
2036	59421	6008213,41	2505431,80	392124,58	20205,95	4705,49	105377,07	152637,95	7,4E-08	1,55	3180484,39	10414315,02	-1913528,58	1913528,58	-78700	1834828,58
2037	61204	6188459,81	2580610,35	403890,76	20812,25	4846,69	108539,04	157218,04	7,7E-08	1,59	3275918,73	10726764,28	-1970954,24	1970954,24	-78700	1892254,24
2038	63040	6374113,61	2658023,60	416006,69	21436,58	4992,08	111795,00	161934,28	7,9E-08	1,64	3374189,87	11048560,78	-2030076,44	2030076,44	-78700	1951376,44
2039	64931	6565337,01	2737755,88	428485,57	22079,61	5141,83	115148,49	166791,79	8,1E-08	1,69	3475404,86	11380006,90	-2090968,03	2090968,03	-78700	2012268,03
2040	66879	6762297,12	2819891,51	441340,60	22742,02	5296,09	118603,07	171795,72	8,4E-08	1,74	3579670,75	11721410,85	-2153700,82	2153700,82	36000000	38153700,82

SENSITIVITY ANALYSIS 2 - LLEIDA - REUS

YEAR	PASS	TOT.AIR.TRANSP(€)	R.T.Time(€)	H.V.Funct€)	B.Pol.(€)	B.Noise(€)	B.Driver(€)	B.Fuel(€)	Num.B.Acc	B.Acc(€)	BUS T.(70% Boí)(€)	TRANSP.(Air; 70% Boí; 30% Aigüestortes)(€)	CBALleida-Girona	BorC(€)/Year	OtherCashFlow(€)	C.Flow(€)
2010	61769	7368230,19	2035503,51	310057,92	15977,10	3720,70	85612,15	120692,78	3,219E-07	5,53	2571569,68	10970817,52	-2390450,99	2390450,99	-90000000	-87609549,01
2011	33000	3936466,45	1087464,84	165648,00	8535,74	1987,78	45738,17	64479,95	1,72E-07	2,95	1373857,43	5861143,59	-1277095,03	1277095,03	-78700	1198395,03
2012	33041	3941357,21	1088815,93	165853,81	8546,35	1990,25	45794,99	64560,06	1,722E-07	2,96	1375564,34	5868425,61	-1278681,72	1278681,72	-78700	1199981,72
2013	29443	3512163,08	970249,31	147793,15	7615,69	1773,52	40808,15	57529,79	1,534E-07	2,64	1225772,25	5229383,35	-1139439,66	1139439,66	-78700	1060739,66
2014	30400	3626320,61	1001785,79	152596,95	7863,23	1831,16	42134,55	59399,71	1,584E-07	2,72	1265614,12	5399356,52	-1176475,42	1176475,42	-78700	1097775,42
2015	30200	3602463,24	995195,10	151593,02	7811,50	1819,12	41857,35	59008,92	1,574E-07	2,70	1257287,71	5363834,43	-1168735,45	1168735,45	-78700	1090035,45
2016	32900	3924537,77	1084169,49	165146,04	8509,88	1981,75	45599,57	64284,55	1,715E-07	2,95	1369694,22	5843382,55	-1273225,04	1273225,04	-78700	1194525,04
2017	33887	4042273,90	1116694,58	170100,42	8765,17	2041,21	46967,55	66213,09	1,766E-07	3,03	1410785,05	6018684,02	-1311421,79	1311421,79	-78700	1232721,79
2018	34904	4163542,12	1150208,27	175205,39	9028,23	2102,46	48377,12	68200,24	1,819E-07	3,12	1453124,84	6199260,78	-1350780,68	1350780,68	-78700	1272080,68
2019	35951	4288448,38	1184710,56	180460,95	9299,05	2165,53	49828,27	70246,02	1,874E-07	3,22	1496713,59	6385233,61	-1391299,11	1391299,11	-78700	1312599,11
2020	37029	4484643,17	1220234,41	185872,11	9577,88	2230,47	51322,38	72352,36	1,93E-07	3,32	1541592,93	6644309,88	-1441458,68	1441458,68	-78700	1362758,68
2021	38140	4619182,46	1256845,73	191448,93	9865,25	2297,39	52862,23	74523,19	1,988E-07	3,41	1587846,13	6843644,59	-1484707,85	1484707,85	-78700	1406007,85
2022	39284	4757757,93	1294544,51	197191,39	10161,16	2366,30	54447,82	76758,49	2,047E-07	3,52	1635473,19	7048945,60	-1529240,76	1529240,76	-78700	1450540,76
2023	40463	4900490,67	1333396,66	203109,55	10466,12	2437,31	56081,92	79062,18	2,109E-07	3,62	1684557,37	7260433,96	-1575137,97	1575137,97	-78700	1496437,97
2024	41677	5047505,39	1373402,19	209203,38	10780,13	2510,44	57764,53	81434,26	2,172E-07	3,73	1735098,67	7478251,55	-1622396,69	1622396,69	-78700	1543696,69
2025	42927	5198930,55	1414594,04	215477,93	11103,45	2585,74	59497,04	83876,69	2,237E-07	3,84	1787138,72	7702586,19	-1671055,68	1671055,68	-78700	1592355,68
2026	44215	5354898,47	1457038,12	221943,22	11436,60	2663,32	61282,22	86393,36	2,304E-07	3,96	1840760,79	7933671,69	-1721195,26	1721195,26	-78700	1642495,26
2027	45541	5515545,43	1500734,43	228599,26	11779,59	2743,19	63120,06	88984,28	2,373E-07	4,08	1895964,88	8171663,11	-1772812,39	1772812,39	-78700	1694112,39
2028	46908	5681011,79	1545781,84	235461,10	12133,17	2825,53	65014,73	91655,31	2,445E-07	4,20	1952875,89	8416845,06	-1826028,82	1826028,82	-78700	1747328,82
2029	48315	5851442,14	1592147,39	242523,73	12497,11	2910,28	66964,84	94404,50	2,518E-07	4,33	2011452,17	8669340,42	-1880799,69	1880799,69	-78700	1802099,69
2030	49764	6172217,25	1639896,98	249797,18	12871,90	2997,57	68973,16	97235,76	2,594E-07	4,46	2071777,00	9074633,74	-1955358,93	1955358,93	-78700	1876658,93
2031	51257	6357383,77	1689096,52	257291,50	13258,08	3087,50	71042,46	100152,99	2,671E-07	4,59	2133933,64	9346876,08	-2014023,02	2014023,02	-78700	1935323,02
2032	52795	6548105,28	1739778,98	265011,70	13655,90	3180,14	73174,14	103158,14	2,751E-07	4,73	2197963,72	9627294,44	-2074455,79	2074455,79	-78700	1995755,79
2033	54379	6744548,44	1791977,29	272962,81	14065,61	3275,55	75369,57	106253,18	2,834E-07	4,87	2263908,88	9916119,52	-2136695,71	2136695,71	-78700	2057995,71
2034	56010	6946884,90	1845724,41	281149,83	14487,49	3373,80	77630,15	109440,05	2,919E-07	5,01	2331810,74	10213587,70	-2200781,17	2200781,17	-78700	2122081,17
2035	57690	7155291,44	1901086,26	289582,82	14922,03	3474,99	79958,63	112722,67	3,007E-07	5,16	2401752,58	10519982,84	-2266792,12	2266792,12	-78700	2188092,12
2036	59421	7369950,19	1958128,74	298271,81	15369,77	3579,26	82357,81	116104,93	3,097E-07	5,32	2473817,64	10835594,82	-2334808,37	2334808,37	-78700	2256108,37
2037	61204	7591048,69	2016884,79	307221,82	15830,96	3686,66	84829,06	119588,81	3,19E-07	5,48	2548047,58	11160678,06	-2404868,03	2404868,03	-78700	2326168,03
2038	63040	7818780,15	2077387,38	316437,88	16305,86	3797,25	87373,76	123176,24	3,285E-07	5,64	2624484,01	11495493,41	-2477009,07	2477009,07	-78700	2398309,07
2039	64931	8053343,56	2139702,41	325930,01	16794,98	3911,16	89994,70	126871,13	3,384E-07	5,81	2703210,20	11840349,89	-2551311,02	2551311,02	-78700	2472611,02
2040	66879	8294943,86	2203895,79	335708,26	17298,85	4028,50	92694,63	130677,40	3,485E-07	5,99	2784309,42	12195563,30	-2627853,26	2627853,26	36000000	38627853,26

SENSITIVITY ANALYSIS 2 - LLEIDA - BARCELONA

YEAR	PASS	TOT.AIR.TRANSP(€)	R.T.Time(€)	H.V.Funct€)	B.Pol.(€)	B.Noise(€)	B.Driver(€)	B.Fuel(€)	Num.B.Acc	B.Acc(€)	BUS T.(70% Boí)(€)	TRANSP.(Air; 70% Boí; 30% Aigüestortes)(€)	CBALleida-Girona	BorC(€)/Year	OtherCashFlow(€)	C.Flow(€)
2010	61769	6914278,76	2414789,87	408955,70	21073,25	4907,47	101564,72	159189,62	7,707E-08	1,60	3110482,23	11214261,10	-2633894,57	2633894,57	-90000000	-87366105,43
2011	33000	3693943,55	1290098,04	218484,00	11258,35	2621,81	54260,81	85046,82	4,118E-08	0,86	1661770,69	5991202,97	-1407154,41	1407154,41	-78700	1328454,41
2012	33041	3698533,00	1291700,89	218755,45	11272,34	2625,07	54328,22	85152,49	4,123E-08	0,86	1663835,31	5998646,59	-1408902,69	1408902,69	-78700	1330202,69
2013	29443	3295781,21	1151041,11	194934,07	10044,84	2339,21	48412,15	75879,81	3,674E-08	0,76	1482651,95	5345423,91	-1255480,22	1255480,22	-78700	1176780,22
2014	30400	3402905,57	1188453,95	201270,11	10371,33	2415,24	49985,71	78346,17	3,793E-08	0,79	1530843,30	5519168,80	-1296287,70	1296287,70	-78700	1217587,70
2015	30200	3380518,04	1180635,18	199945,96	10303,10	2399,35	49656,86	77830,73	3,768E-08	0,78	1520771,96	5482858,48	-1287759,49	1287759,49	-78700	1209059,49
2016	32900	3682749,78	1286188,65	217821,93	11224,24	2613,86	54096,38	84789,11	4,105E-08	0,85	1656735,02	5973047,81	-1402890,31	1402890,31	-78700	1324190,31
2017	33887	3793232,28	1324774,31	224356,59	11560,96	2692,28	55719,27	87332,78	4,228E-08	0,88	1706437,07	6152239,25	-1444977,02	1444977,02	-78700	1366277,02
2018	34904	3907029,24	1364532,79	231089,86	11907,92	2773,08	57391,49	89953,77	4,355E-08	0,91	1757649,82	6336833,57	-1488353,47	1488353,47	-78700	1409653,47
2019	35951	4024240,12	1405464,08	238021,77	12265,12	2856,26	59113,04	92652,07	4,486E-08	0,93	1810373,27	6526930,23	-1532995,73	1532995,73	-78700	1454295,73
2020	37029	4208287,32	1447607,28	245158,91	12632,89	2941,91	60885,56	95430,27	4,62E-08	0,96	1864657,78	6786021,24	-1583170,04	1583170,04	-78700	1504470,04
2021	38140	4334535,94	1491040,58	252514,54	13011,93	3030,17	62712,34	98293,51	4,759E-08	0,99	1920604,06	6989610,92	-1630674,19	1630674,19	-78700	1551974,19
2022	39284	4464572,02	1535763,98	260088,65	13402,22	3121,06	64593,38	101241,80	4,902E-08	1,02	1978212,11	7199285,33	-1679580,49	1679580,49	-78700	1600880,49
2023	40463	4598509,18	1581855,67	267894,49	13804,45	3214,73	66531,97	104280,29	5,049E-08	1,05	2037582,65	7415297,30	-1730001,32	1730001,32	-78700	1651301,32
2024	41677	4736464,46	1629315,64	275932,05	14218,62	3311,18	68528,11	107408,99	5,2E-08	1,08	2098715,67	7637763,88	-1781909,02	1781909,02	-78700	1703209,02
2025	42927	4878558,39	1678182,99	284207,96	14645,07	3410,50	70583,45	110630,46	5,356E-08	1,11	2161661,53	7866875,22	-1835344,71	1835344,71	-78700	1756644,71
2026	44215	5024915,14	1728535,90	292735,46	15084,49	3512,83	72701,26	113949,86	5,517E-08	1,15	2226520,94	8102894,70	-1890418,27	1890418,27	-78700	1811718,27
2027	45541	5175662,60	1780374,39	301514,54	15536,87	3618,17	74881,56	117367,20	5,682E-08	1,18	2293293,91	8345950,21	-1947099,50	1947099,50	-78700	1868399,50
2028	46908	5330932,48	1833815,72	310565,07	16003,24	3726,78	77129,27	120890,20	5,853E-08	1,22	2362131,50	8596382,32	-2005566,08	2005566,08	-78700	1926866,08
2029	48315	5490860,45	1888820,81	319880,44	16483,25	3838,57	79442,76	124516,28	6,029E-08	1,25	2432983,36	8854257,09	-2065716,36	2065716,36	-78700	1987016,36
2030	49764	5791741,12	1945467,84	329473,87	16977,59	3953,69	81825,30	128250,61	6,209E-08	1,29	2505950,20	9256008,33	-2136733,51	2136733,51	-78700	2058033,51
2031	51257	5965493,35	2003835,01	339358,62	17486,95	4072,30	84280,19	132098,34	6,396E-08	1,33	2581132,73	9533694,15	-2200841,09	2200841,09	-78700	2122141,09
2032	52795	6144458,16	2063961,39	349541,30	18011,66	4194,50	86809,07	136062,03	6,588E-08	1,37	2658581,32	9819725,16	-2266886,51	2266886,51	-78700	2188186,51
2033	54379	6328791,90	2125886,10	360028,53	18552,06	4320,34	89413,59	140144,28	6,785E-08	1,41	2738346,31	10114327,36	-2334903,55	2334903,55	-78700	2256203,55
2034	56010	6518655,66	2189648,22	370826,93	19108,49	4449,92	92095,39	144347,66	6,989E-08	1,45	2820478,07	10417731,42	-2404924,89	2404924,89	-78700	2326224,89
2035	57690	6714215,33	2255325,94	381949,76	19681,65	4583,40	94857,76	148677,31	7,198E-08	1,50	2905077,30	10730242,48	-2477051,76	2477051,76	-78700	2398351,76
2036	59421	6915641,79	2322997,44	393410,24	20272,20	4720,92	97703,98	153138,41	7,414E-08	1,54	2992244,73	11052170,64	-2551384,19	2551384,19	-78700	2472684,19
2037	61204	7123111,04	2392701,83	405214,99	20880,49	4862,58	100635,71	157733,51	7,637E-08	1,59	3082030,70	11383761,51	-2627951,48	2627951,48	-78700	2549251,48
2038	63040	7336804,37	2464478,20	417370,65	21506,86	5008,45	103654,59	162465,21	7,866E-08	1,63	3174485,58	11725266,01	-2706781,67	2706781,67	-78700	2628081,67
2039	64931	7556908,50	2538404,72	429890,44	22152,00	5158,69	106763,89	167338,65	8,102E-08	1,68	3269710,08	12077010,06	-2787971,19	2787971,19	-78700	2709271,19
2040	66879	7783615,76	2614559,60	442787,62	22816,59	5313,45	109966,93	172358,99	8,345E-08	1,73	3367804,91	12439325,24	-2871615,20	2871615,20	36000000	38871615,20

SENSITIVITY ANALYSIS 2 - LLEIDA - TOULOUSE

YEAR	PASS	TOT.AIR.TRANSP(€)	R.T.Time(€)	H.V.Funct€)	B.Pol.(€)	B.Noise(€)	B.Driver(€)	B.Fuel(€)	Num.B.Acc	B.Acc(€)	BUS T.(70% Boí)(€)	TRANSP.(Air; 70% Boí; 30% Aigüestortes)(€)	CBALleida-Girona	BorC(€)/Year	OtherCashFlow(€)	C.Flow(€)
2010	61769	5099692,80	1928039,04	300702,72	15495,03	3608,43	81092,25	117051,19	1,048E-07	2,18	2445990,84	8568053,47	12313,06	-12313,06	-90000000	-90012313,06
2011	33000	2724511,94	1030052,10	160650,00	8278,20	1927,80	43323,42	62534,43	5,6E-08	1,16	1306767,11	4577478,67	6569,89	-6569,89	-78700	-85269,89
2012	33041	2727912,55	1031331,86	160849,60	8288,49	1930,20	43377,25	62612,12	5,607E-08	1,17	1308390,67	4583181,45	6562,44	-6562,44	-78700	-85262,44
2013	29443	2430837,37	919024,97	143333,88	7385,91	1720,01	38653,68	55793,98	4,996E-08	1,04	1165913,46	4084076,75	5866,94	-5866,94	-78700	-84566,94
2014	30400	2509853,42	948896,48	147992,73	7625,98	1775,91	39910,06	57607,47	5,159E-08	1,07	1203809,70	4216828,83	6052,26	-6052,26	-78700	-84752,26
2015	30200	2493341,23	942653,74	147019,09	7575,81	1764,23	39647,49	57228,48	5,125E-08	1,07	1195889,90	4189086,54	6012,45	-6012,45	-78700	-84712,45
2016	32900	2716255,84	1026930,73	160163,18	8253,11	1921,96	43192,14	62344,93	5,583E-08	1,16	1302807,21	4563607,52	6549,98	-6549,98	-78700	-85249,98
2017	33887	2797748,72	1057738,65	164968,08	8500,71	1979,62	44487,90	64215,28	5,751E-08	1,20	1341891,43	4700520,95	6741,28	-6741,28	-78700	-85441,28
2018	34904	2881718,43	1089482,98	169919,02	8755,83	2039,03	45823,05	66142,48	5,923E-08	1,23	1382163,62	4841595,73	6884,37	-6884,37	-78700	-85584,37
2019	35951	2968164,97	1122163,73	175016,00	9018,47	2100,19	47197,58	68126,52	6,101E-08	1,27	1423623,77	4986831,84	7102,66	-7102,66	-78700	-85802,66
2020	37029	3103568,83	1155812,10	180263,90	9288,89	2163,17	48612,82	70169,32	6,284E-08	1,31	1466311,50	5182765,95	20085,25	-20085,25	-78700	-98785,25
2021	38140	3196702,87	1190490,52	185672,45	9567,59	2228,07	50071,37	72274,64	6,472E-08	1,35	1510305,99	5338283,21	20653,53	-20653,53	-78700	-99353,53
2022	39284	3292597,60	1226198,99	191241,65	9854,57	2294,90	51573,25	74442,50	6,666E-08	1,39	1555607,25	5498414,12	21290,72	-21290,72	-78700	-99990,72
2023	40463	3391399,84	1262999,94	196981,24	10150,33	2363,77	53121,08	76676,69	6,866E-08	1,43	1602294,48	5663417,80	21878,18	-21878,18	-78700	-100578,18
2024	41677	3493161,62	1300893,37	202891,21	10454,86	2434,69	54714,85	78977,20	7,072E-08	1,47	1650367,67	5833346,30	22508,57	-22508,57	-78700	-101208,57
2025	42927	3597930,33	1339910,50	208976,44	10768,43	2507,72	56355,89	81345,92	7,285E-08	1,51	1699866,42	6008303,14	23227,37	-23227,37	-78700	-101927,37
2026	44215	3705852,78	1380113,75	215246,66	11091,53	2582,96	58046,82	83786,66	7,503E-08	1,56	1750869,94	6188547,45	23928,98	-23928,98	-78700	-102628,98
2027	45541	3817033,06	1421503,11	221701,87	11424,17	2660,42	59787,63	86299,41	7,728E-08	1,61	1803378,22	6374183,30	24667,42	-24667,42	-78700	-103367,42
2028	46908	3931561,28	1464172,24	228356,67	11767,09	2740,28	61582,27	88889,85	7,96E-08	1,65	1857510,05	6565469,27	25346,98	-25346,98	-78700	-104046,98
2029	48315	4049494,15	1508089,92	235206,20	12120,04	2822,47	63429,43	91556,09	8,199E-08	1,70	1913225,85	6762405,89	26134,83	-26134,83	-78700	-104834,83
2030	49764	4270824,96	1553318,57	242260,20	12483,53	2907,12	65331,72	94301,92	8,445E-08	1,76	1970604,81	7065098,79	54176,03	-54176,03	-78700	-132876,03
2031	51257	4398951,05	1599920,62	249528,40	12858,05	2994,34	67291,77	97131,13	8,698E-08	1,81	2029726,12	7277057,59	55795,47	-55795,47	-78700	-134495,47
2032	52795	4530913,09	1647927,29	257015,66	13243,87	3084,19	69310,91	100045,61	8,959E-08	1,86	2090629,39	7495379,11	57459,54	-57459,54	-78700	-136159,54
2033	54379	4666864,54	1697369,79	264726,86	13641,22	3176,72	71390,43	103047,27	9,228E-08	1,92	2153354,21	7720272,97	59150,84	-59150,84	-78700	-137850,84
2034	56010	4806854,81	1748279,34	272666,86	14050,36	3272,00	73531,66	106137,98	9,505E-08	1,98	2217940,18	7951844,71	60961,82	-60961,82	-78700	-139661,82
2035	57690	4951034,71	1800718,35	280845,41	14471,80	3370,14	75737,22	109321,55	9,79E-08	2,03	2284466,51	8190357,46	62833,26	-62833,26	-78700	-141533,26
2036	59421	5099607,11	1854749,27	289272,23	14906,03	3471,27	78009,73	112601,77	1,008E-07	2,10	2353012,38	8436126,39	64660,06	-64660,06	-78700	-143360,06
2037	61204	5252621,40	1910403,29	297952,20	15353,30	3575,43	80350,50	115980,52	1,039E-07	2,16	2423617,41	8689257,04	66553,00	-66553,00	-78700	-145253,00
2038	63040	5410179,02	1967711,65	306890,18	15813,87	3682,68	82760,86	119459,71	1,07E-07	2,22	2496321,18	8949906,99	68577,35	-68577,35	-78700	-147277,35
2039	64931	5572482,84	2026736,75	316095,91	16288,24	3793,15	85243,42	123043,12	1,102E-07	2,29	2571202,89	9218391,42	70647,45	-70647,45	-78700	-149347,45
2040	66879	5739631,64	2087541,04	325579,13	16776,90	3906,95	87800,82	126734,55	1,135E-07	2,36	2648341,75	9494921,40	72788,63	-72788,63	36000000	35927211,37

CBA LLEIDA - GIRONA - Sensitivity Analysis 3

YEAR	TOTAL PASSENGERS	PYRENEES PASSENGERS (70%)	CBA - TOTAL TRANSPORT COST / YEAR (€)	Benefits or Costs / Year (€)	Other Cash Flows (€)	Cash Flow / Year (€)		
2010	61769	43238,30	885939,08	-885939,08	-90000000,00	-90885939,08	IRR	-0,07
2011	33000	23100,00	811925,55	-811925,55	-78700,00	-890625,55		
2012	33041	23128,70	812031,03	-812031,03	-78700,00	-890731,03		
2013	29443	20610,10	802774,52	-802774,52	-78700,00	-881474,52		
2014	30400	21280,00	805236,58	-805236,58	-78700,00	-883936,58		
2015	30200	21140,00	804722,04	-804722,04	-78700,00	-883422,04		
2016	32900	23030,00	811668,29	-811668,29	-78700,00	-890368,29		
2017	37930	26551,00	824608,11	-824608,11	-78700,00	-903308,11		
2018	43728	30609,60	839526,16	-839526,16	-78700,00	-918226,16		
2019	50413	35289,10	856724,85	-856724,85	-78700,00	-935424,85		
2020	58121	40684,70	883178,59	-883178,59	-78700,00	-961878,59		
2021	67006	46904,20	907050,80	-907050,80	-78700,00	-985750,80		
2022	77250	54075,00	934572,55	-934572,55	-78700,00	-1013272,55		
2023	89060	62342,00	966301,78	-966301,78	-78700,00	-1045001,78		
2024	102675	71872,50	1002881,73	-1002881,73	-78700,00	-1081581,73		
2025	118372	82860,40	1045053,96	-1045053,96	-78700,00	-1123753,96		
2026	136468	95527,60	1093673,41	-1093673,41	-78700,00	-1172373,41		
2027	157331	110131,70	1149725,73	-1149725,73	-78700,00	-1228425,73		
2028	181384	126968,80	1214347,24	-1214347,24	-78700,00	-1293047,24		
2029	209113	146379,10	1288847,98	-1288847,98	-78700,00	-1367547,98		
2030	241082	168757,40	1418711,65	-1418711,65	-78700,00	-1497411,65		
2031	277938	194556,60	1524455,30	-1524455,30	-78700,00	-1603155,30		
2032	320429	224300,30	1646364,87	-1646364,87	-78700,00	-1725064,87		
2033	369416	258591,20	1786911,77	-1786911,77	-78700,00	-1865611,77		
2034	425892	298124,40	1948945,27	-1948945,27	-78700,00	-2027645,27		
2035	491001	343700,70	2135750,18	-2135750,18	-78700,00	-2214450,18		
2036	566065	396245,50	2351113,53	-2351113,53	-78700,00	-2429813,53		
2037	652604	456822,80	2599401,29	-2599401,29	-78700,00	-2678101,29		
2038	752373	526661,10	2885646,89	-2885646,89	-78700,00	-2964346,89		
2039	867394	607175,80	3215653,25	-3215653,25	-78700,00	-3294353,25		
2040	1000000	700000,00	3596110,46	-3596110,46	36000000,00	32403889,54		

CBA LLEIDA - REUS - Sensitivity Analysis 3 (IRR=3'5%)

YEAR	TOTAL PASSENGERS	PYRENEES PASSENGERS (70%)	CBA - TOTAL TRANSPORT COST / YEAR (€)	Benefits or Costs / Year (€)	Other Cash Flows (€)	Cash Flow / Year (€)		
2010	61769	43238	-523082,98	523082,98	-90000000	-89476917,02	IRR	3,5%
2011	33000	23100	59157,53	-59157,53	-78700	-137857,53		
2012	33041	23129	58327,75	-58327,75	-78700	-137027,75		
2013	29443	20610	131145,76	-131145,76	-78700	-209845,76		
2014	30400	21280	111777,55	-111777,55	-78700	-190477,55		
2015	30200	21140	115825,24	-115825,24	-78700	-194525,24		
2016	32900	23030	61181,38	-61181,38	-78700	-139881,38		
2017	38521	26965	-52588,96	52588,96	-78700	-26111,04		
2018	45103	31572	-185798,77	185798,77	-78700	107098,77		
2019	52810	36967	-341769,60	341769,60	-78700	263069,60		
2020	61834	43284	-538488,59	538488,59	-78700	459788,59		
2021	72399	50679	-754722,09	754722,09	-78700	676022,09		
2022	84769	59338	-1007902,54	1007902,54	-78700	929202,54		
2023	99254	69478	-1304342,90	1304342,90	-78700	1225642,90		
2024	116213	81349	-1651434,82	1651434,82	-78700	1572734,82		
2025	136069	95248	-2057832,92	2057832,92	-78700	1979132,92		
2026	159319	111523	-2533670,61	2533670,61	-78700	2454970,61		
2027	186541	130579	-3090812,76	3090812,76	-78700	3012112,76		
2028	218415	152891	-3743151,52	3743151,52	-78700	3664451,52		
2029	255734	179014	-4506952,76	4506952,76	-78700	4428252,76		
2030	299431	209602	-5510493,92	5510493,92	-78700	5431793,92		
2031	350593	245415	-6576273,76	6576273,76	-78700	6497573,76		
2032	410498	287349	-7824159,08	7824159,08	-78700	7745459,08		
2033	480638	336447	-9285265,48	9285265,48	-78700	9206565,48		
2034	562762	393933	-10996025,20	10996025,20	-78700	10917325,20		
2035	658919	461243	-12999095,48	12999095,48	-78700	12920395,48		
2036	771506	540054	-15344422,24	15344422,24	-78700	15265722,24		
2037	903330	632331	-18090485,45	18090485,45	-78700	18011785,45		
2038	1057678	740375	-21305757,31	21305757,31	-78700	21227057,31		
2039	1238400	866880	-25070409,61	25070409,61	-78700	24991709,61		
2040	1450000	1015000	-29478312,75	29478312,75	36000000	65478312,75		
			-184235836,88					

CBA LLEIDA - REUS - Sensitivity Analysis 3 (IRR=0%)

YEAR	TOTAL PASSENGERS	PYRENEES PASSENGERS (70%)	CBA - TOTAL TRANSPORT COST / YEAR (€)	Benefits or Costs / Year (€)	Other Cash Flows (€)	Cash Flow / Year (€)		
2010	61769	43238	-523082,98	523082,98	-90000000	-89476917,02	IRR	0,0%
2011	33000	23100	59157,53	-59157,53	-78700	-137857,53		
2012	33041	23129	58327,75	-58327,75	-78700	-137027,75		
2013	29443	20610	131145,76	-131145,76	-78700	-209845,76		
2014	30400	21280	111777,55	-111777,55	-78700	-190477,55		
2015	30200	21140	115825,24	-115825,24	-78700	-194525,24		
2016	32900	23030	61181,38	-61181,38	-78700	-139881,38		
2017	36431	25502	-10279,46	10279,46	-78700	-68420,54		
2018	40341	28239	-89409,71	89409,71	-78700	10709,71		
2019	44670	31269	-177032,49	177032,49	-78700	98332,49		
2020	49465	34626	-285337,17	285337,17	-78700	206637,17		
2021	54773	38341	-393987,56	393987,56	-78700	315287,56		
2022	60652	42456	-514298,68	514298,68	-78700	435598,68		
2023	67161	47013	-647522,00	647522,00	-78700	568822,00		
2024	74369	52058	-795043,31	795043,31	-78700	716343,31		
2025	82351	57646	-958397,11	958397,11	-78700	879697,11		
2026	91189	63832	-1139282,60	1139282,60	-78700	1060582,60		
2027	100975	70683	-1339581,34	1339581,34	-78700	1260881,34		
2028	111812	78268	-1561376,82	1561376,82	-78700	1482676,82		
2029	123812	86668	-1806976,16	1806976,16	-78700	1728276,16		
2030	137100	95970	-2128948,29	2128948,29	-78700	2050248,29		
2031	151814	106270	-2435461,34	2435461,34	-78700	2356761,34		
2032	168108	117676	-2774870,42	2774870,42	-78700	2696170,42		
2033	186150	130305	-3150706,04	3150706,04	-78700	3072006,04		
2034	206128	144290	-3566877,63	3566877,63	-78700	3488177,63		
2035	228250	159775	-4027714,19	4027714,19	-78700	3949014,19		
2036	252747	176923	-4538009,30	4538009,30	-78700	4459309,30		
2037	279872	195910	-5103071,03	5103071,03	-78700	5024371,03		
2038	309909	216936	-5728777,12	5728777,12	-78700	5650077,12		
2039	343170	240219	-6421636,13	6421636,13	-78700	6342936,13		
2040	380000	266000	-7188855,14	7188855,14	36000000	43188855,14		
			-56769118,80					

CBA LLEIDA - BARCELONA - Sensitivity Analysis 3 (IRR=0%)

YEAR	TOTAL PASSENGERS	PYRENEES PASSENGERS (70%)	CBA - TOTAL TRANSPORT COST / YEAR (€)	Benefits or Costs / Year (€)	Other Cash Flows (€)	Cash Flow / Year (€)		
2010	61769	43238	12173,56	-12173,56	-90000000	-90012173,56	IRR	0%
2011	33000	23100	345117,57	-345117,57	-78700	-423817,57		
2012	33041	23129	344643,08	-344643,08	-78700	-423343,08		
2013	29443	20610	386282,78	-386282,78	-78700	-464982,78		
2014	30400	21280	375207,41	-375207,41	-78700	-453907,41		
2015	30200	21140	377522,01	-377522,01	-78700	-456222,01		
2016	32900	23030	346274,87	-346274,87	-78700	-424974,87		
2017	37764	26435	289988,92	-289988,92	-78700	-368688,92		
2018	43346	30342	225382,31	-225382,31	-78700	-304082,31		
2019	49754	34828	151225,01	-151225,01	-78700	-229925,01		
2020	57109	39976	59594,74	-59594,74	-78700	-138294,74		
2021	65551	45886	-39070,66	39070,66	-78700	-39629,34		
2022	75242	52669	-152321,60	152321,60	-78700	73621,60		
2023	86364	60455	-282314,24	282314,24	-78700	203614,24		
2024	99131	69392	-431523,48	431523,48	-78700	352823,48		
2025	113786	79650	-602790,07	602790,07	-78700	524090,07		
2026	130607	91425	-799374,71	799374,71	-78700	720674,71		
2027	149914	104940	-1025020,14	1025020,14	-78700	946320,14		
2028	172076	120453	-1284022,35	1284022,35	-78700	1205322,35		
2029	197513	138259	-1581312,44	1581312,44	-78700	1502612,44		
2030	226711	158698	-1963902,55	1963902,55	-78700	1885202,55		
2031	260226	182158	-2361698,19	2361698,19	-78700	2282998,19		
2032	298694	209086	-2818299,30	2818299,30	-78700	2739599,30		
2033	342850	239995	-3342398,99	3342398,99	-78700	3263698,99		
2034	393533	275473	-3943975,46	3943975,46	-78700	3865275,46		
2035	451708	316196	-4634481,99	4634481,99	-78700	4555781,99		
2036	518483	362938	-5427064,95	5427064,95	-78700	5348364,95		
2037	595130	416591	-6336814,12	6336814,12	-78700	6258114,12		
2038	683107	478175	-7381050,01	7381050,01	-78700	7302350,01		
2039	784089	548862	-8579653,55	8579653,55	-78700	8500953,55		
2040	900000	630000	-9955444,66	9955444,66	36000000	45955444,66		
			-60029121,19					

CBA LLEIDA - BARCELONA - Sensitivity Analysis 3 (IRR = 4%)

YEAR	TOTAL PASSENGERS	PYRENEES PASSENGERS (70%)	CBA - TOTAL TRANSPORT COST / YEAR (€)	Benefits or Costs / Year (€)	Other Cash Flows (€)	Cash Flow / Year (€)		
2010	61769	43238	12173,56	-12173,56	-90000000	-90012173,56	IRR	4%
2011	33000	23100	345117,57	-345117,57	-78700	-423817,57		
2012	33041	23129	344643,08	-344643,08	-78700	-423343,08		
2013	29443	20610	386282,78	-386282,78	-78700	-464982,78		
2014	30400	21280	375207,41	-375207,41	-78700	-453907,41		
2015	30200	21140	377522,01	-377522,01	-78700	-456222,01		
2016	32900	23030	346274,87	-346274,87	-78700	-424974,87		
2017	39789	27852	266551,44	-266551,44	-78700	-345251,44		
2018	48120	33684	170135,20	-170135,20	-78700	-248835,20		
2019	58195	40737	53530,93	-53530,93	-78700	-132230,93		
2020	70381	49267	-95511,81	95511,81	-78700	16811,81		
2021	85117	59582	-267738,33	267738,33	-78700	189038,33		
2022	102939	72057	-476026,35	476026,35	-78700	397326,35		
2023	124493	87145	-727926,55	727926,55	-78700	649226,55		
2024	150560	105392	-1032570,65	1032570,65	-78700	953870,65		
2025	182085	127460	-1401002,36	1401002,36	-78700	1322302,36		
2026	220211	154148	-1846577,81	1846577,81	-78700	1767877,81		
2027	266319	186423	-2385449,66	2385449,66	-78700	2306749,66		
2028	322082	225457	-3037152,69	3037152,69	-78700	2958452,69		
2029	389521	272665	-3825311,95	3825311,95	-78700	3746611,95		
2030	471081	329757	-4864424,32	4864424,32	-78700	4785724,32		
2031	569717	398802	-6035185,15	6035185,15	-78700	5956485,15		
2032	689007	482305	-7451084,65	7451084,65	-78700	7372384,65		
2033	833274	583292	-9163450,95	9163450,95	-78700	9084750,95		
2034	1007749	705424	-11234359,47	11234359,47	-78700	11155659,47		
2035	1218755	853129	-13738883,25	13738883,25	-78700	13660183,25		
2036	1473943	1031760	-16767814,41	16767814,41	-78700	16689114,41		
2037	1782564	1247795	-20430955,50	20430955,50	-78700	20352255,50		
2038	2155804	1509063	-24861099,97	24861099,97	-78700	24782399,97		
2039	2607195	1825037	-30218846,13	30218846,13	-78700	30140146,13		
2040	3153100	2207170	-36698418,98	36698418,98	36000000	72698418,98		
			-193882352,08					

CBA LLEIDA - TOULOUSE - Sensitivity Analysis 3

YEAR	TOTAL PASSENGERS	PYRENEES PASSENGERS (70%)	CBA - TOTAL TRANSPORT COST / YEAR (€)	Benefits or Costs / Year (€)	Other Cash Flows (€)	Cash Flow / Year (€)		
2010	61769	43238	1739618,24	-1739618,24	-90000000	-91739618,24	IRR	-11%
2011	33000	23100	1268002,42	-1268002,42	-78700	-1346702,42		
2012	33041	23129	1268674,55	-1268674,55	-78700	-1347374,55		
2013	29443	20610	1209691,83	-1209691,83	-78700	-1288391,83		
2014	30400	21280	1225380,12	-1225380,12	-78700	-1304080,12		
2015	30200	21140	1222101,48	-1222101,48	-78700	-1300801,48		
2016	32900	23030	1266363,11	-1266363,11	-78700	-1345063,11		
2017	36074	25252	1318393,04	-1318393,04	-78700	-1397093,04		
2018	39554	27688	1375442,33	-1375442,33	-78700	-1454142,33		
2019	43370	30359	1437995,18	-1437995,18	-78700	-1516695,18		
2020	47554	33288	1522845,86	-1522845,86	-78700	-1601545,86		
2021	52141	36499	1599618,78	-1599618,78	-78700	-1678318,78		
2022	57171	40020	1683798,01	-1683798,01	-78700	-1762498,01		
2023	62687	43881	1776098,03	-1776098,03	-78700	-1854798,03		
2024	68734	48114	1877302,28	-1877302,28	-78700	-1956002,28		
2025	75365	52756	1988269,73	-1988269,73	-78700	-2066969,73		
2026	82635	57845	2109942,25	-2109942,25	-78700	-2188642,25		
2027	90607	63425	2243352,56	-2243352,56	-78700	-2322052,56		
2028	99348	69544	2389633,01	-2389633,01	-78700	-2468333,01		
2029	108932	76252	2550025,18	-2550025,18	-78700	-2628725,18		
2030	119441	83609	2791248,40	-2791248,40	-78700	-2869948,40		
2031	130963	91674	2990384,54	-2990384,54	-78700	-3069084,54		
2032	143597	100518	3208731,42	-3208731,42	-78700	-3287431,42		
2033	157450	110215	3448142,30	-3448142,30	-78700	-3526842,30		
2034	172639	120847	3710649,23	-3710649,23	-78700	-3789349,23		
2035	189294	132506	3998480,30	-3998480,30	-78700	-4077180,30		
2036	207555	145289	4314078,52	-4314078,52	-78700	-4392778,52		
2037	227578	159305	4660122,61	-4660122,61	-78700	-4738822,61		
2038	249533	174673	5039549,70	-5039549,70	-78700	-5118249,70		
2039	273605	191524	5455580,25	-5455580,25	-78700	-5534280,25		
2040	300000	210000	5911745,41	-5911745,41	36000000	30088254,59		
			78601260,68					